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State University of New York at Plattsburgh
Auditory Research Laboratories

Report No. ARL 88-3

# The Effects of Blast Trauma (Impulse Noise) on Hearing: A Parametric Study

Annual Report

Roger P. Hamernik
William A. Ahroon
Robert I. Davis
Keng D. Hsueh
George A. Turrentine

July 23, 1988

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## ABSTRACT

of this research

There are three broad goals to this contract. The first and primary goal is to study the effects of high level blast wave exposure on the conductive and sensory structures of the mammalian ear. This includes the use of the evoked potential to measure hearing thresholds and tuning curves prior to and after exposure to various blast wave exposures. Parameters of the blast waves studied include intensity, spectral composition, number of impulses and repetition rate. Correlations among hearing measures, exposure variables and histology are to be developed. The second objective is to develop a series of blast wave generation devices which are suitable for the laboratory simulation of a wide spectrum of blast waves. The third objective is to develop a suitable set of software and a PC-based computer system which will interact with crystal and capacitive microphones to capture and analyze blast waves.

During the second year of this contract the following ~~progress~~ toward these goals has been made: (a) the Lamont 5-inch diameter shock tube operating on a mechanical quick release valve principle was installed ~~in the~~ laborator~~y~~ and calibrated at 150, 155 and 160 dB peak SPL; (b) interactive and analytical software was that has been under developm~~ent~~ed for the past two years has been completed; (c) thirty animals have been exposed to the mid-frequency (1.0 kHz) energy-content blast waves. While it is too premature to discuss these results, the results ~~to date~~ ~~indicate that these blast waves~~ which are substantially more hazardous to hearing than are the low-frequency (0.125 kHz) energy-content waves reported on previously (see Hamernik et al., 1988, Rpt I). There were two surprising features of these data. First, the variability in hearing measures associated with exposures to the low frequency waves does not seem to be affecting the animals exposed to the mid-frequency waves. ~~That is,~~ preliminary hearing loss measures are consistent across animals in any given exposure paradigm. Second, the slowest repetition rate for the 10X condition consistently produces the most severe effects. (d) A set of rules have been developed and implemented on the DEC MicroPDP-11/73 microcomputer system which will systematically calculate tuning curve variables such as $Q_{10dB}$; high frequency slope and low frequency slope. An analysis of 650 tuning curves using this system has shown that there are systematic changes in tuning curve morphology that are related to the degree of permanent threshold shift. Furthermore, these changes are correlated with outer sensory cell losses in a frequency specific manner.

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# FOREWORD

## Disclaimer

Citations of commercial organizations and trade names in this report do not constitute an official Department of the Army endorsement or approval of the products or services of these organizations.

## Animal Use

In conducting the research described in this report, the investigators adhered to the "Guide for the Care and use of Laboratory Animals," prepared by the Committee on Care and Use of Laboratory Animals of the Institute of Laboratory Animal Resources, National Research Council (DHHS Publication No. (NIH) 86-23, revised 1985).

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## I. TECHNICAL PROGRESS

A. "LAMONT" 5-INCH DRIVER SOURCE: In the first year of the current project, a conventional shock tube using high and low pressure chambers separated by a diaphragm was employed to create the blast waves to which chinchilla were exposed. The highest frequency-content energy for the conventional tube was approximately 0.125 kHz. Two additional shock tubes were installed during the second year of this project. These tubes use an entirely different operating principle and produce blast waves with much different spectral distributions of energy.

Description: The "Lamont air-gun" 5-inch driver source is shown schematically in Figure 1. This device is essentially a shock tube driver section which uses a fast acting valve to rapidly discharge a high pressure air reservoir instead of bursting a diaphragm as in a conventional shock tube. Similar devices, which operate on a completely different scale, have been developed for use in sonic boom studies (e.g., see NASA SP-180 - Second Conference on Sonic Boom Research, 1968). The "Lamont" air gun was designed at the Lamont Geological Observatory of Columbia University for the purpose of producing undersea explosive discharges for use in Geological research. This driver, when coupled to an expansion section and an acoustic horn, is capable of generating well-controlled high sound pressure level blast waves. The "Lamont" driver while obsolete for the purpose for which it was developed, has the advantage of producing a discharge directed in the axial direction. Commercially available air guns (e.g., Western Geophysical) generally produce radial discharges which are less suitable for laboratory operations. Engineers at the National Acoustics Laboratory of Australia designed an axial discharge device (Kenna, 1982) for use in blast wave research. However, their design has proved to be unreliable.

The "Lamont" driver uses a simple design with only one moving part. An aluminum piston is sealed in a steel casing by a series of "o" rings. The piston's geometry is such that two volumes are created within the steel casing. When low pressure air ($P_L$) enters the larger of the two volumes the piston is fully retracted and seated against the Teflon™ seal on the base plate. In this position, the smaller volume is sealed from the outside by an "o" ring and high pressure air ($P_H$) can charge the smaller volume. The seal is maintained by the proper balance between $P_L$ and $P_H$. The gun is discharged by rapidly bleeding off $P_L$, which causes the piston to move forward breaking the seal. When discharged at sufficient pressure into an expansion section a shock wave is formed within several diameters downstream.

The two air guns in our laboratory operate in the range of 200-3000 psi with $P_L$ typically 1/7 $P_H$ and have compression section volumes of approximately 4 cu. in. and 10 cu. in. The volume, diameter and charge pressure of the driver will determine the strength of the shock wave and other characteristics of the wave system developed in the expansion section.

Calibration of "Lamont" Source: The pressure-time configuration of the 160 dB peak SPL wave produced by the "Lamont" 5-inch driver is shown in Figure 2 along with the A-weighted waveform which was reconstructed from the A-weighted FFT amplitude spectrum without any phase correction. The top panels of Figures 3 and 4 illustrate the relative and absolute energy spectra of this wave while the lower panels show the A-weighted spectra. The "Lamont" driver produces a second peak trailing the primary wave by approximately 26 ms. The total energy in the entire 33 ms analysis window is displayed in Table I with the energies of the primary and

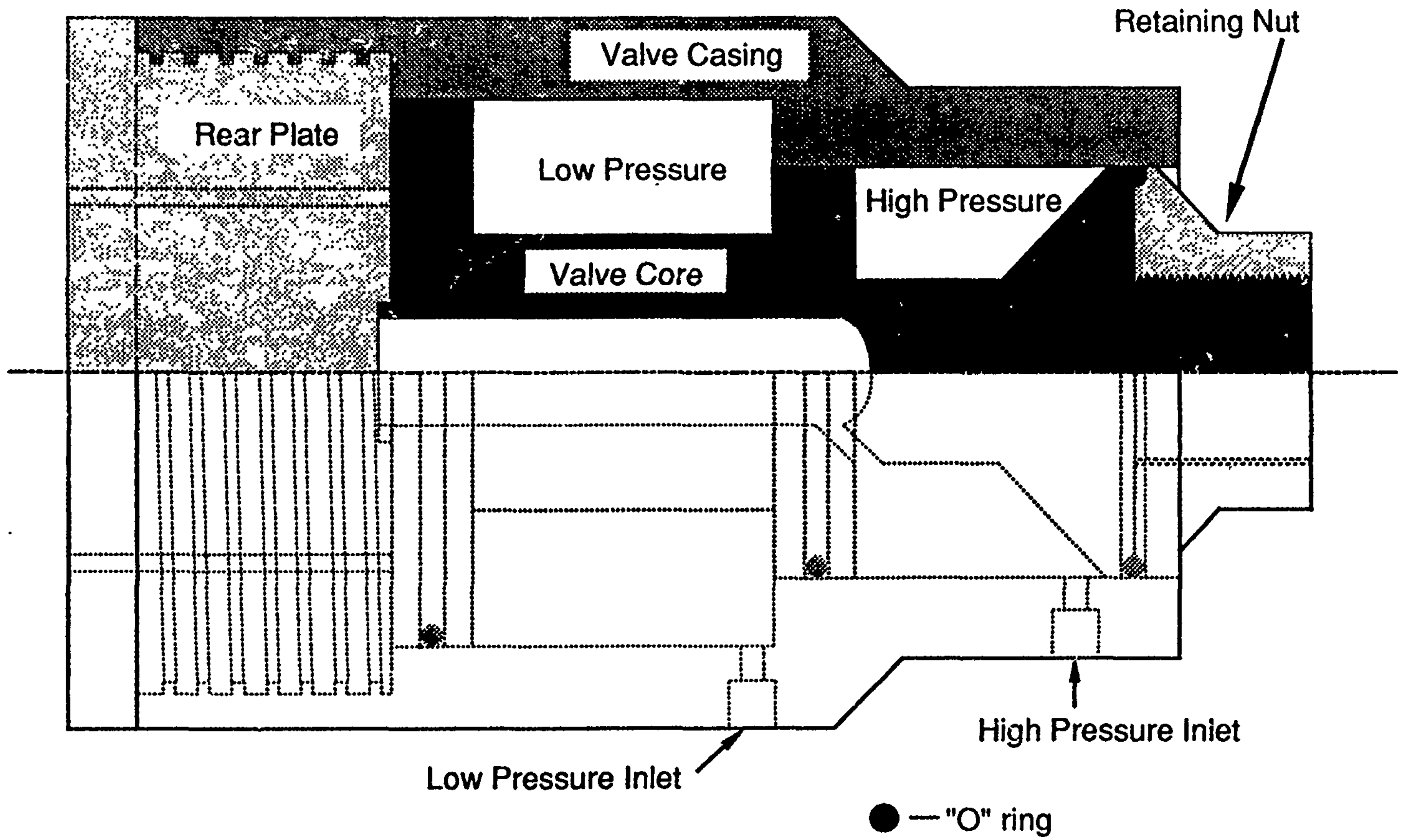



*Figure 1. Schematic of the Lamont Quick-acting Valve.*

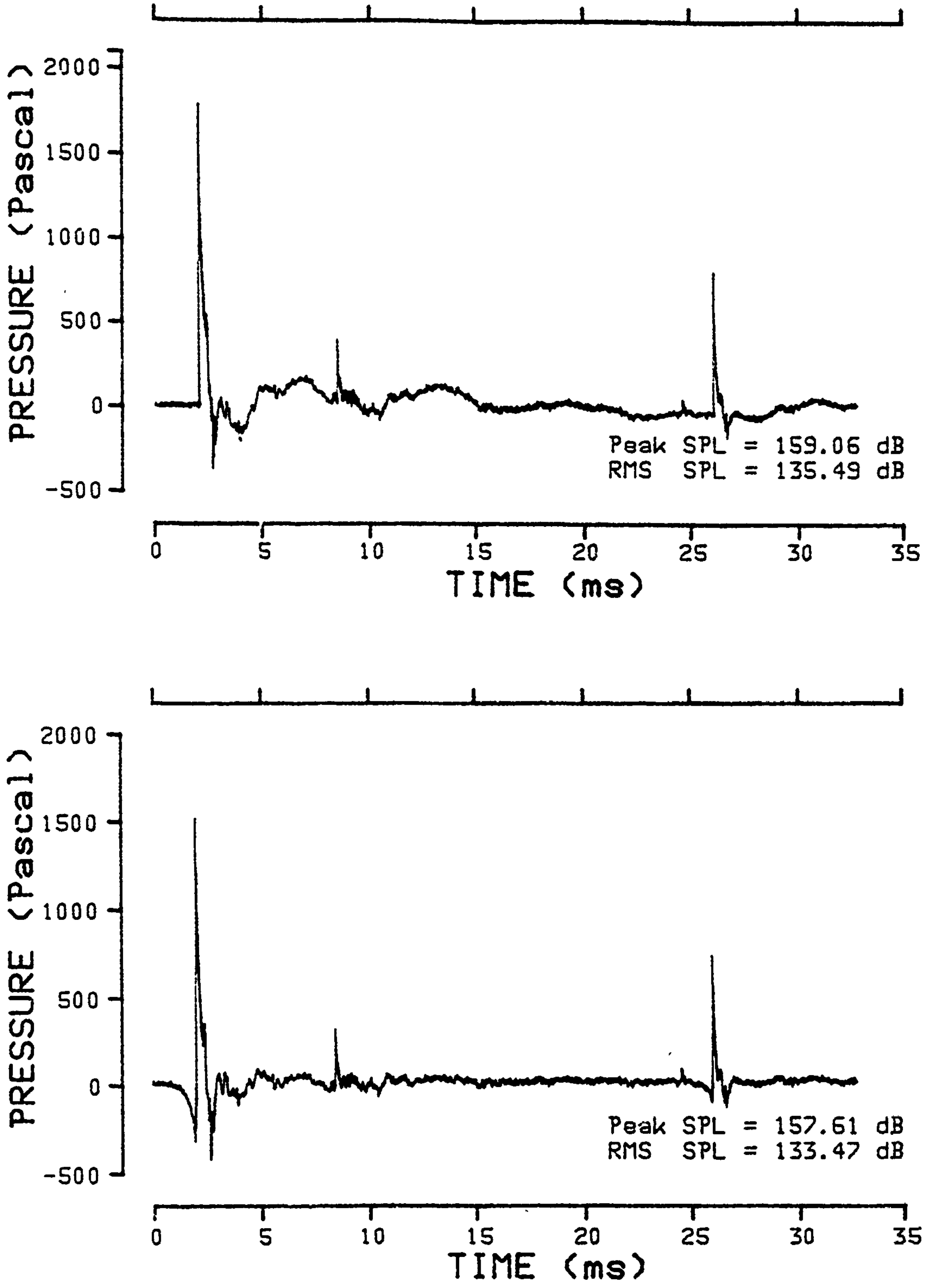



*Figure 2. Pressure-time waveforms for the 160 dB peak SPL blast wave from the 5-inch "Lamont" shock tube. Upper trace is the actual recording. Lower trace is the waveform reconstructed from the A-weighted FFT amplitude spectrum without changing phase.*

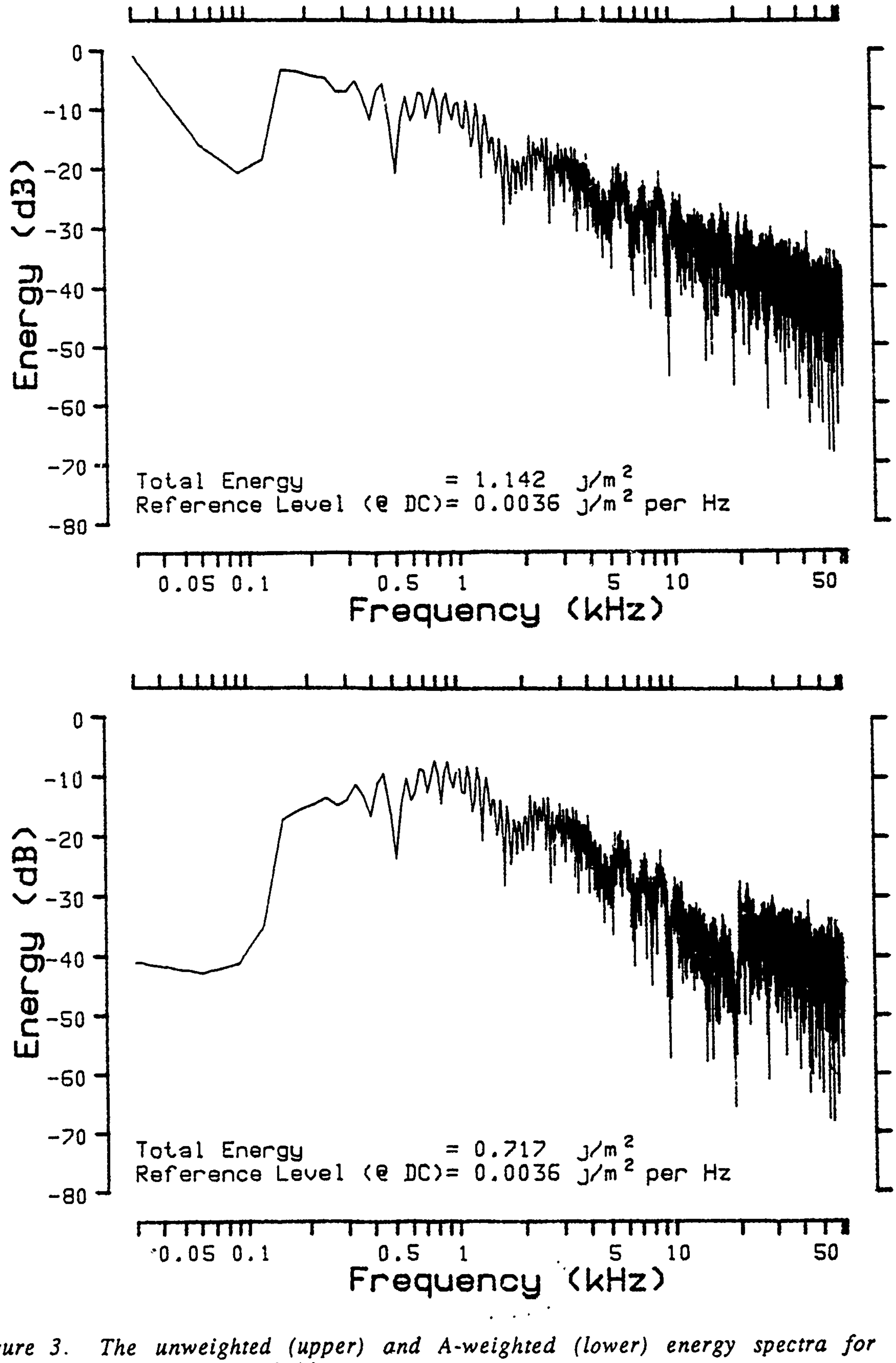



*Figure 3. The unweighted (upper) and A-weighted (lower) energy spectra for the 160 dB peak SPL blast wave.*

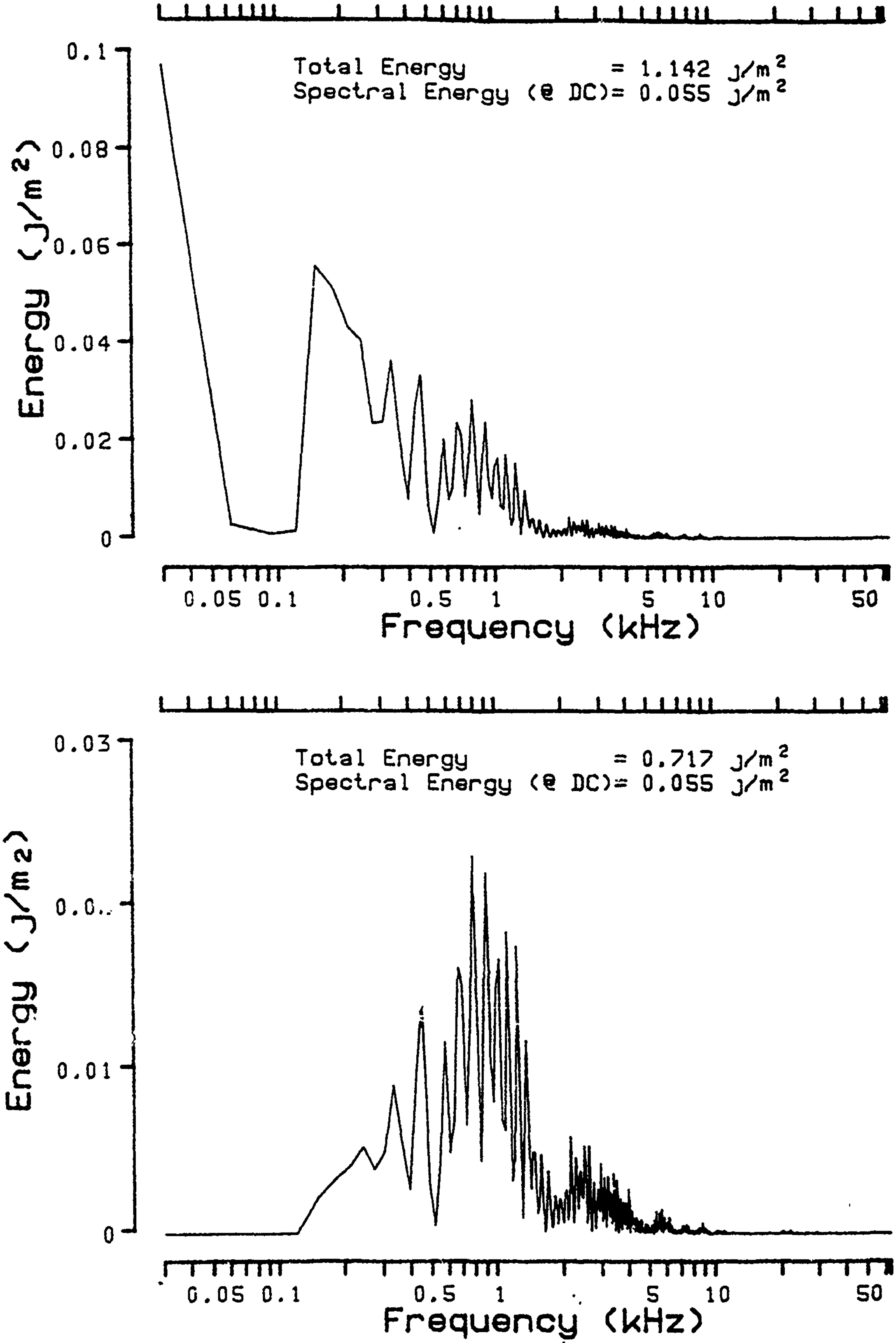



*Figure 4. The unweighted (upper) and A-weighted (lower) energy spectra for the 160 dB peak SPL blast wave in absolute units.*

secondary waves. The second peak contains approximately one-tenth the energy of the primary wave. The bar graph shown in Figure 5 compares the octave band energy distribution of the 160 dB peak SPL waves produced by the "Lamont" driver and the conventional shock tube (see Report I). The unweighted comparison of these two waves shows that the wave produced by the conventional shock tube contains a great deal more energy than the "Lamont" driver waveform. However, when the same comparison is made after an A-weighting is performed, the total energies of the two waves are similar but the peaks in the energy distribution are located at two different octave band frequencies, i.e., 0.250 kHz and 1.0 kHz for the conventional tube and the "Lamont" source respectively. Comparison figures are also presented in Table II. Figure 6 illustrates the mounting and installation of the "Lamont" 5-inch driver.

B <u>ADDITIONAL AUDITORY EVOKED POTENTIAL STATION</u>: Another complete and independent evoked potential system has been installed. This system is shown schematically in Figure 7. The addition of this second system allows for a single individual to test two animals simultaneously, thus allowing more animals to be tested. At present our capacity is 15 animals/month.

C. <u>SOFTWARE</u>: Interactive software that has been under development for the past two years has been completed. At present two Digital Equipment Corporation (DEC) MicroPDP-11/73 microcomputers, a Macintosh II and three Compaq 286 Deskpro personal computers (PC) can communicate with the host DEC MicroPDP-11/73. Thus all the anatomical data which results from the morphometric software routines; the evoked potential threshold data; three tuning curve variables and the stimulus variables can all be interrelated. For example, sensory cell variables such as total losses, octave band losses etc. can be compared with total energy of the stimulus, octave band energies weighted or unweighted. Similarly, thresholds can be handled in a variety of ways; i.e. averaged over several frequencies; taken at each octave, and compared with cell losses in that octave or with the energy of the stimulus at the same octave etc. (See Report I for a detailed description.)

This capability will now allow us to proceed uninhibited with the primary objectives of collecting data from exposure paradigms using the remaining three blast wave sources; i.e. the two quick acting valve tubes and the spark discharge. We have begun to routinely run 15 animals/month using this newly created system. This will allow us to complete the additional 315 animal exposures over the course of the final three years of the contract.

## II. SCIENTIFIC PROGRESS

<u>"LAMONT" DRIVER EXPOSURES</u>: The top panel of Figure 8 summarizes the threshold shift measured immediately after exposure ($TS_0$) to the set of 160 dB peak SPL exposures of 10 blast waves. These data, obtained from the 5-inch "Lamont" driver which produces blast waves with maximal energies in the 1 kHz octave band, are compared to results obtained using the conventional shock tube which produces a blast wave with maximal energy in the 0.125 kHz octave band (bottom panel). The $TS_0$ data for the 1.0 kHz and the 0.125 kHz driver are systematic in showing that for these exposure conditions the slowest repetition rate of 1 blast wave/10 min. produces the largest threshold shift. This is a surprising and unexpected result. When repetition rates are greater than one per second, one expects that the middle ear reflex will have a protective effect on the threshold shifts that are produced. However, with the most rapid repetition rate that we have used, one per six seconds,

Table I

Total Energy in the 160 dB Blast Wave Generated by the Lamont Tube for three different analysis windows

| Analysis Window (msec) | | Total Energy (J/m$^2$) |
|---|---|---|
| Full | (0 - 32.768) | 1.14 |
| 1st half | (0 - 16.384) | 1.02 |
| 2nd half | (16.385 - 32.768) | 0.12 |

Table II

Total unweighted and A-weighted energies for 160 dB peak SPL blast waves from conventional and 5-inch "Lamont" shock tubes.

| Device | Weight | Absolute Energy (J/m$^2$) | | | Relative Energy (dB) re: 1J/m$^2$ | | |
|---|---|---|---|---|---|---|---|
| | | 1X | 10X | 100X | 1X | 10X | 100X |
| Lamont | None | 1.14 | 11.35 | 113.48 | 0.55 | 10.55 | 20.55 |
| | A | 0.80 | 7.97 | 79.65 | -0.99 | 9.01 | 19.01 |
| Conventional | None | 4.37 | 43.70 | 436.99 | 6.40 | 16.40 | 26.40 |
| | A | 0.72 | 7.24 | 72.36 | -1.41 | 8.60 | 18.60 |

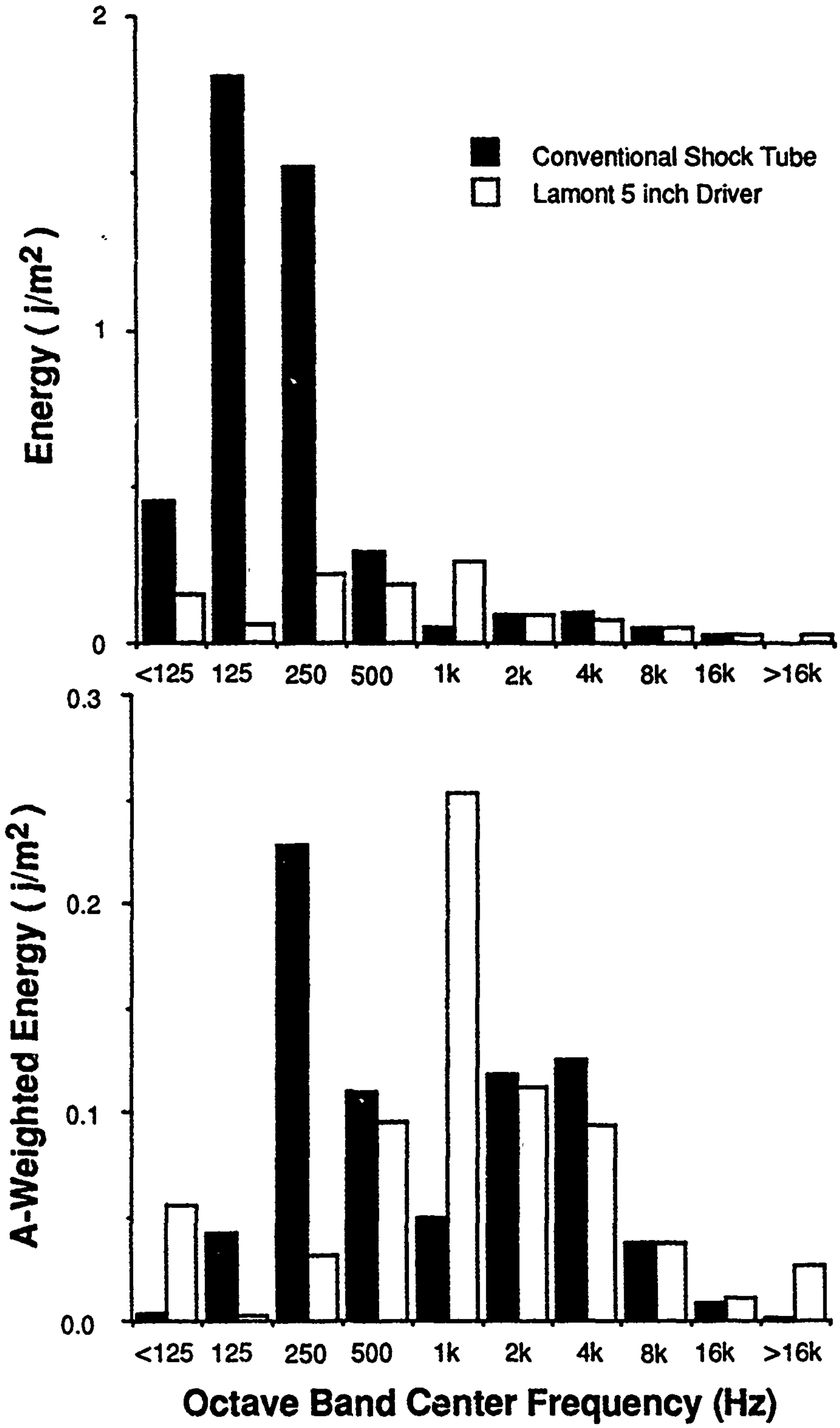



*Figure 5. Unweighted (upper) and A-weighted (lower) octave band energies of 160 dB peak SPL blast waves for the conventional and 5-inch "Lamont" shock tubes.*

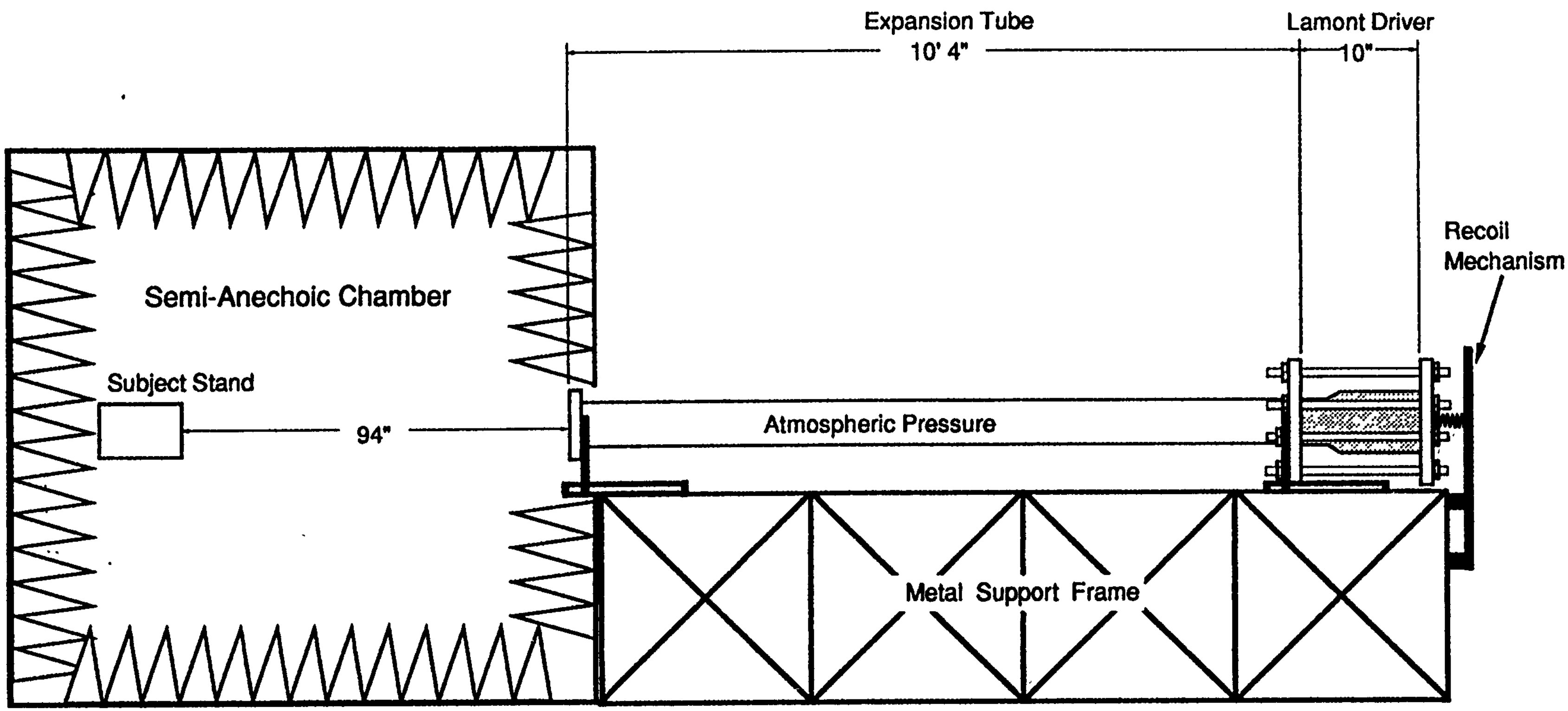



*Figure 6. Schematic Side View of the Lamont Shock Tube*

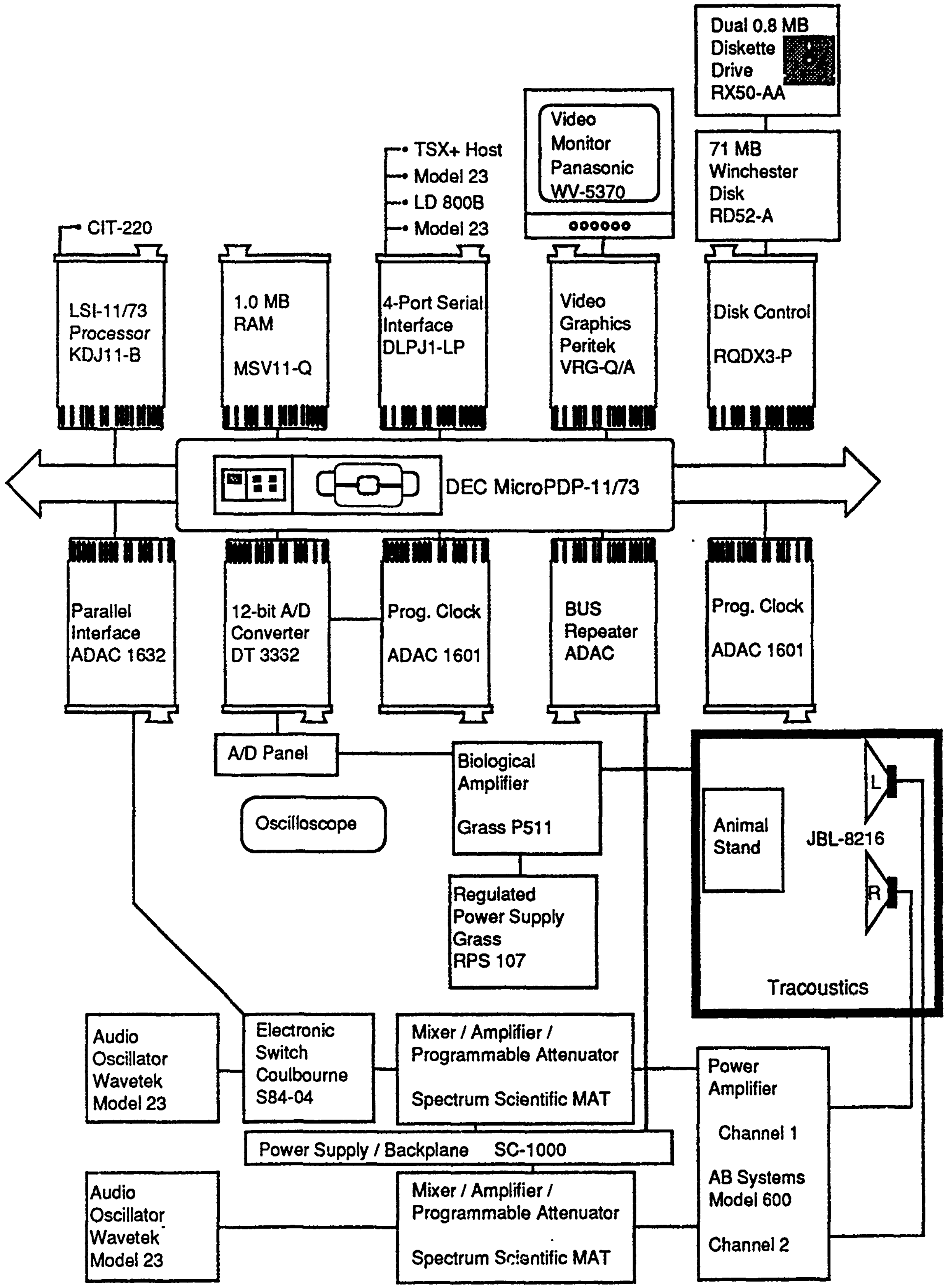
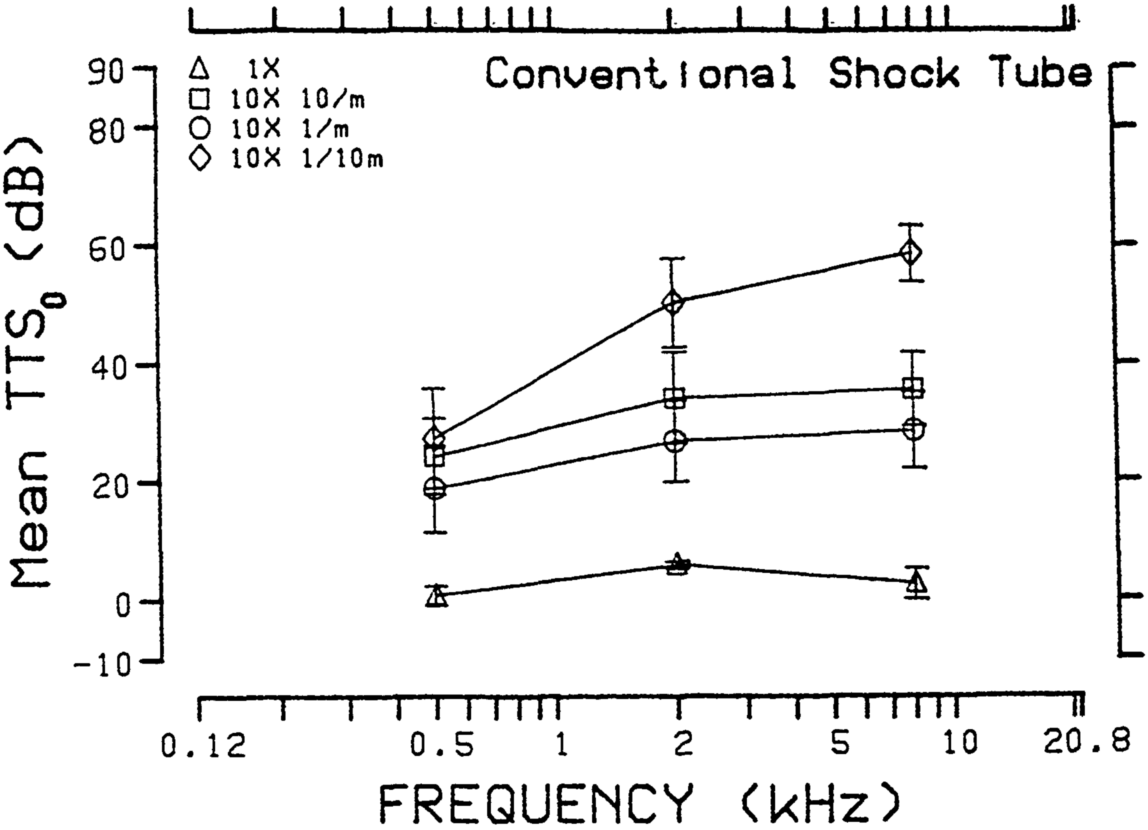



*Figure 7. Schematic representation of second evoked potential laboratory computer system.*



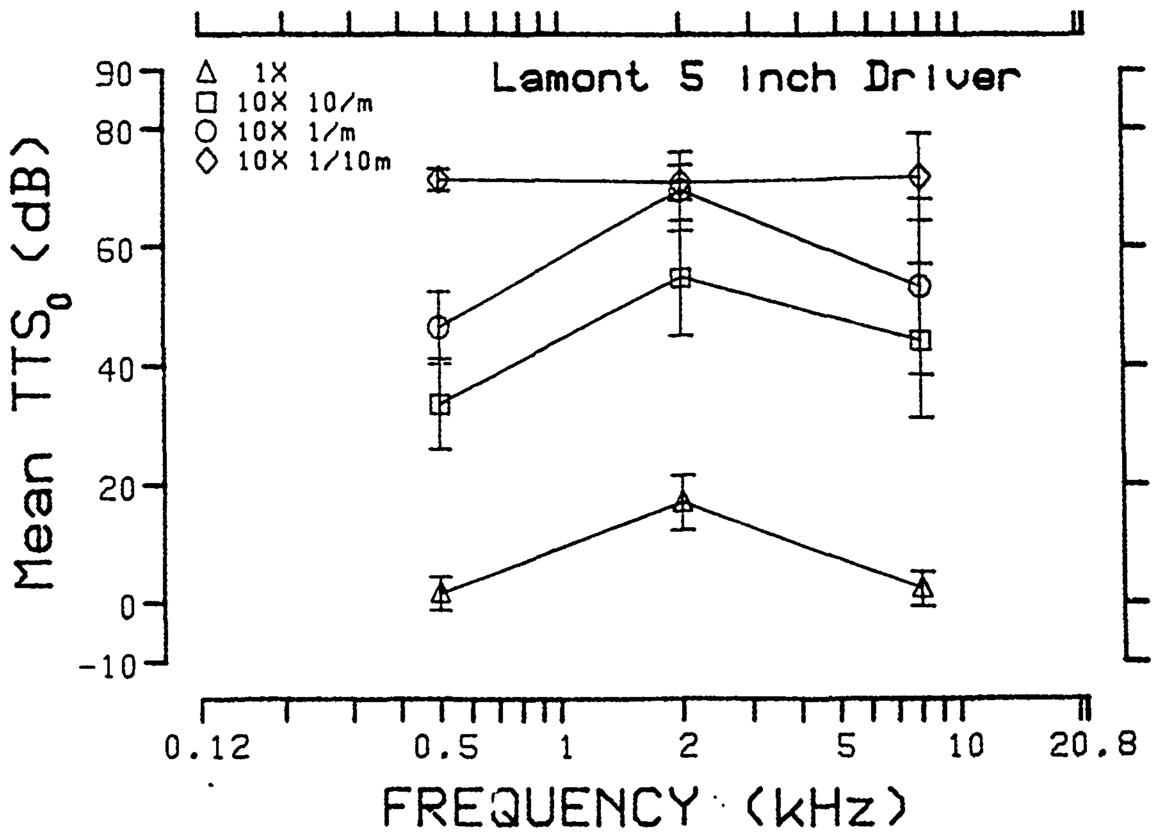




*Figure 8. Mean $TS_0$ for groups of animals exposed to ten 160 dB peak SPL blast waves from a conventional (upper) or 5-inch "Lamont" (lower) shock tube.*

the reflex should not be a factor. Thus the repetition rate effect seen in Figure 7 probably reflects the vulnerability of the biological recovery process in the cochlea. While these results are unusual and contrary to the limited data published in the past, the effect is consistent across two very different blast wave sources. However these conclusions are only preliminary and valid only for the initial threshold shift. The PTS and sensory cell loss data which have not yet been completed must yield comparable data before we can be confident in this result.

The differences between the initial threshold shifts using the two different blast wave sources must be related to the energy content of the blast waves. For the "Lamont" tube, the total energy in ten 160 dB presentations is 11.4 $J/m^2$; in the 1.0 kHz octave band the total energy is 2.6 $J/m^2$; while the total A-weighted energy is 8.0 $J/m^2$. For the conventional shock tube the corresponding energies are: Total energy = 43.7 $J/m^2$; total energy in the 1 kHz octave band = 0.5 $J/m^2$; total A-weighted energy = 7.2 $J/m^2$. Thus, the increased effect seen with the "Lamont" driver would appear to be related to energy levels at specific octave bands and not to the total energy or to the commonly used parameter of total A-weighted energy. It should also be noted that the greatest shift is seen at the 2.0 kHz test frequency, i.e., at a frequency above the peak of the wave spectrum. The 2.0 kHz data for the 10X, 1/10m exposure could be higher than that shown in Figure 8 but at the 2.0 kHz frequency we are at the upper limit of our test system. The 0.5 and 8.0 kHz data are within the range of our system and therefore are accurate means. Thus, the 1/10m data, in reality, follows the configuration of the other three exposures presented in Figure 8.

## EVOKED POTENTIAL TUNING CURVES

INTRODUCTION: Attempts at correlating hearing loss with hair cell loss have met with varying degrees of success. Some investigators have found threshold shifts of 30 - 50 dB with outer hair cell loss (e.g., Moody et al., 1976; Ryan and Dallos, 1975) while others have reported little or no hearing loss with significant OHC loss (Hunter-Duvar and Elliott, 1973; Henderson et al., 1974). Still others have reported hearing losses of 20 - 40 dB with little hair cell loss (Lindquist et al., 1954; Hunter-Duvar and Elliott, 1972). Some of the differences may be due to subtle forms of anatomical damage which are difficult to relate to hearing loss patterns, (e.g., isolated, mid-cochlear hair cell lesions versus lesions that extend continuously from base toward the apex of the cochlea). In the case of an isolated lesion, it is possible for the excitation pattern in the cochlea to spread from a damaged region of the cochlea into one that is normal as intensity increases. Thus, the spread of excitation could potentially obscure the correlations between hair cell loss and hearing loss.

One psychophysical method for estimating the underlying spread of excitation involves the use of psychophysical tuning curves. Psychophysical tuning curves are plots (usually an asymmetrical "V" shape) (see Figure 9) which indicate the levels and frequencies of masking tones which prevent the detection of a low level probe tone that is fixed in frequency (Vogten, 1974; Zwicker, 1974). The assumption is that the probe tone excites only a limited region of units along the basilar membrane. Masking presumably occurs when the masking stimulus invades the excitatory region of the probe. Frequencies above and below the probe become effective maskers only at high intensities. Quantitative estimates of the spread of excitation are obtained from the width and depth of the tuning curve tip.

Psychophysical tuning curves have been obtained from human listeners with impaired hearing. In general, when there is an elevation in threshold, the

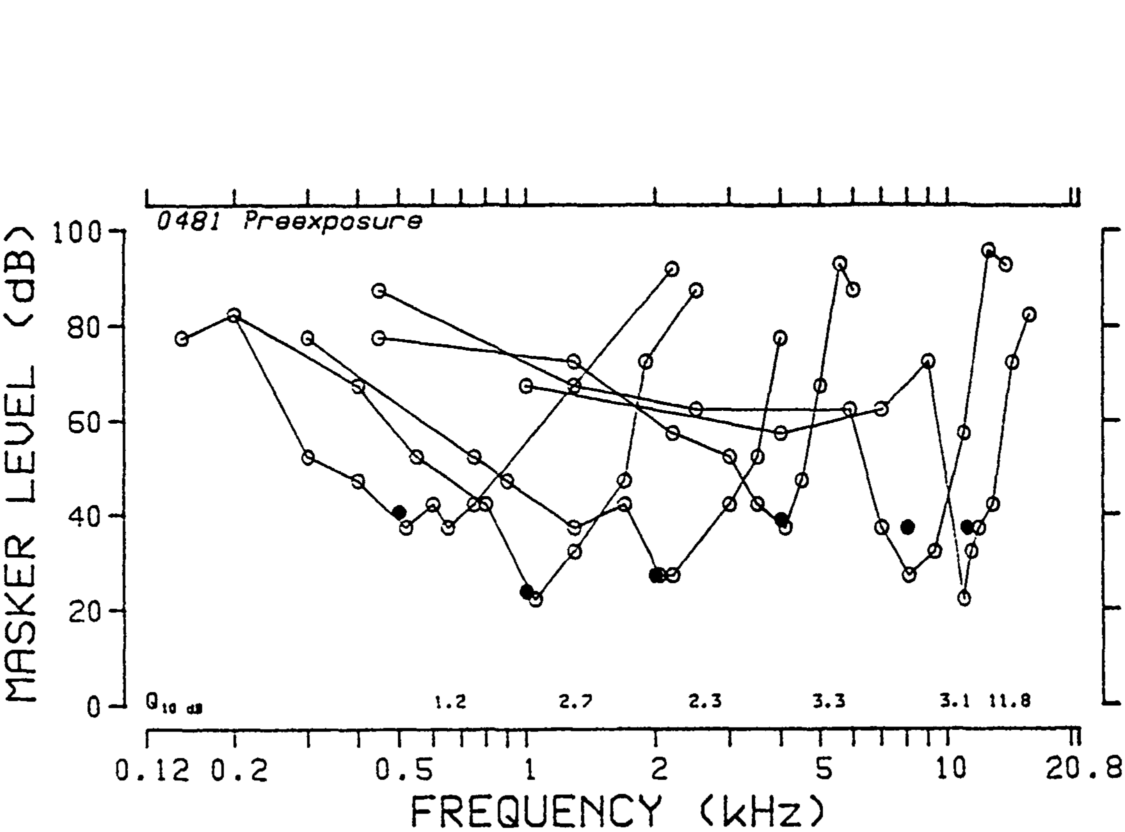



*Figure 9. Typical preexposure AEP tuning curves from one animal.*

psychophysical tuning curve becomes wider (Wightman et al,, 1977; Hoekstra and Ritsma, 1977) and in some cases the low frequency tail of the tuning curve becomes lower, i.e., frequencies below the probe become more effective maskers than normal (Leshowitz and Linstrom, 1977). These results suggest that at intensities near threshold the excitation pattern is relatively broad in impaired listeners. In contrast, there are results from chinchillas treated with Kanamycin, which show normal tuning curve bandwidths with hearing losses up to 30 - 50 dB (Dallos et al., 1977). The Dallos results were correlated with pure OHC losses. The discrepancies between the data from chinchilla and man could simply reflect differences in the underlying cochlear pathologies, i.e., pure OHC versus a mixture of OHC and IHC losses. Since histological data has been unavailable in human studies, there is no way to substantiate this. Thus, there is a need for further studies correlating tuning curve shape with a variety of cochlear histopathologies induced with noise and drugs. The blast wave exposures that we have used generated a variety of complex patterns of inner and outer hair cell loss. Such cochleas present a unique opportunity to study the frequency selectivity of the cochlea and how it is changed by various types of hair cell loss. The shapes of psychophysical tuning curves in hearing impaired persons may ultimately be used to predict the pattern or type of cochlear pathology (i.e., OHC versus IHC loss). The results are also relevant to theoretical problems in auditory research, namely the role of OHC's and IHC's in hearing, i.e., is frequency selectivity determined at the level of the IHC or are the OHC involved with frequency resolution? This, then, is the rationale for obtaining TC's on the animals from this study. However, collecting a psychophysical tuning curve with behavioral measures requires considerable time, consequently we have developed methods to obtain auditory evoked potential (AEP) tuning curves. While changes in tuning characteristics have been observed following a NIPTS, the total number of animals published is very small and the range of PTS's examined is

relatively narrow. The data in this report were obtained from 107 noise exposed chinchillas from which approximately 650 TC's were obtained. It should be noted that this TC sample represents one of the largest accumulations of this type of data in existence. Changes in the morphology of the TC have been related to the degree of PTS and the extent of the sensory cell loss.

METHODS:

Data Collection: The evoked potential tuning curves are obtained using a simultaneous masking paradigm (McGee et al., 1976; Salvi et al., 1982). The probe duration is 20 ms and the intensity is set at 15 dB sensation level. A continuous tone masker is increased over a 35 dB range in an intensity series similar to that used for threshold testing, i.e., at a low enough masker level a clear evoked response is obtained; as masker intensity is increased the response either eventually disappears (i.e., is effectively masked), or persists until the output limitation of the instrumentation is reached (i.e., between 85 - 95 dB). Masked threshold is taken as the intensity mid-way between the lowest intensity where a response was present and the next highest intensity where it was absent. Masking at frequencies above and below the probe tone produces a "V"-shaped tuning curve similar to psychophysical tuning curves (Salvi et al., 1982). AEP tuning curves are measured at each octave frequency from 0.5 kHz to 8 kHz and at 11.2 kHz before exposure and at 30-days post exposure (following threshold determination). During the past year, we have developed a computer-based set of rules to quantify the morphology of the TC's. The technique has been refined for incorporation into our experimental protocol and is described below.

Tuning Curve Analysis: The evoked potential tuning curves were analyzed in two different ways. First, each of the six tuning curves for each animal was analyzed independently. Second, when animals were divided into groups (i.e., by amount of PTS), mean tuning curves were computed by averaging the masking functions for all the animals in the group.

A. Individual Tuning Curves: Three parameters were computed for each individual tuning curve: $Q_{10dB}$, high-frequency slope, and low-frequency slope. The first statistic, $Q_{10dB}$, is defined as the characteristic frequency divided by the bandwidth of the tuning curve 10 dB higher than the threshold at that characteristic frequency, i.e.,

$$Q_{10dB} = \frac{CF}{f_2 - f_1} \qquad (1)$$

where CF is the characteristic frequency, i.e., the frequency (in Hz) of the lowest point (in dB) on the tuning curve; and $f_2$ and $f_1$ represent the frequencies at which the masking function crosses a line 10 dB higher than the threshold at CF. The high- and low-frequency slopes (in dB per octave) represent the slope of the tuning curve function taken from CF toward the higher- or lower-frequency maskers.

These three variables are computed because the tuning curve is considered to be an analogue to an electrical filter. However, the response of an electrical filter can be measured with a high degree of resolution. Single-unit tuning curves obtained from VIII nerve fibers likewise are measured with a resolution of up to 20 to 50 frequencies per octave. Evoked response tuning curves, however, are measured using only approximately 10 frequencies. Of those ten frequencies, not all are

always able to mask the response to the probe, particularly following an exposure that produces a large PTS. Therefore, in computing the individual tuning curve statistics reported in this report, it was necessary to institute a number of rules that would allow us to describe as accurately as possible the frequency selectivity of the auditory system as measured by the evoked potential in animals with normal thresholds as well as in those with varying amounts of PTS. This was not a straightforward task since the morphology of the tuning curve in ears with cochlear damage can be very atypical.

If the tuning curve is thought to be an analogue to an electrical filter, it seemed reasonable to fix the value of the characteristic frequency to that of the masker closest to the probe (see Figure 10). Thus, the CF was defined for the purpose of calculating $Q_{10dB}$ and high- and low-frequency slopes as the masker frequency closest to the probe tone on the high frequency side. The masker frequencies for each of the six probe tones were chosen to provide an estimate of the masking function for a broad frequency region around the probe. Thus, the maskers were selected based upon what is currently known about tuning in the auditory system, and the limitations of testing time and the equipment employed. Table III presents the masking frequencies employed for each probe.

Table III

Evoked Potential Tuning Curve Probe and Masker Frequencies (in kHz)

| Probe | Masker Frequencies | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 0.15 | 0.20 | 0.30 | 0.40 | 0.52* | 0.60 | 0.65 | 0.75 | 1.30 | 2.20 |
| 1.0 | 0.15 | 0.20 | 0.40 | 0.55 | 0.80 | 1.05* | 1.30 | 1.70 | 1.90 | 2.50 |
| 2.0 | 0.30 | 0.75 | 0.90 | 1.30 | 1.70 | 2.05* | 2.20 | 3.00 | 3.50 | 4.00 |
| 4.0 | 0.45 | 1.30 | 2.20 | 3.00 | 3.50 | 4.10* | 4.50 | 5.00 | 5.60 | 6.00 |
| 8.0 | 0.45 | 1.30 | 2.50 | 5.90 | 7.00 | 8.10* | 9.30 | 11.00 | 12.70 | 14.00 |
| 11.2 | 1.00 | 4.00 | 7.00 | 9.00 | 11.00 | 11.50* | 12.00 | 13.00 | 14.50 | 16.00 |

* indicates the frequency used as CF for calculation of tuning curve statistics.

The use of only ten masker frequencies results in several problems when trying to calculate tuning curve statistics. Most of these problems can be resolved by using many more masking frequencies. However, even the use of just 10 masker frequencies is extremely time consuming, typically requiring an hour to obtain only one tuning curve. These problems most often occur when the masking function does not resemble the "typical" tuning curve as might be the case when the subject has a large permanent threshold shift (PTS) (e.g., > 20 dB). This often results in an inability to completely mask the probe with the extreme low and high frequency

maskers (i.e., masked thresholds is beyond the SPL output of the instrumentation.) Therefore, the statistics were computed using rules that we felt most accurately described the underlying tuning of the auditory system.

Figure 10 depicts idealized normal and abnormal evoked potential tuning curves and is used in the following description. For the "normal" tuning curve, the low-frequency slope was computed using the masked thresholds at CF and the two frequencies immediately below CF (i.e., points labeled D, E, and F, where F is defined as CF). Only three points were employed since the low-frequency side of many tuning curves (especially at higher frequencies) appears to consist of two legs of different slopes. The low-frequency slopes reported in this report represent the slope of the low-frequency leg of the tuning curve adjacent to the CF. A simple linear regression of threshold and log frequency resulted in a slope and intercept. If, because of measurement error or with pathological tuning curves, the low-frequency slope was positive or zero (see below), the value reported in our analyses is zero. The numerical values for the low-frequency slope, which has a negative value, are presented in this report as absolute values only.

The high-frequency slope was computed using the all the masker frequencies above the probe frequency for which a masked threshold could be measured (i.e., the points labeled F, G, H, J, and K). Thus, the linear regression coefficients were calculated using two to five or six masked thresholds. The high-frequency slope also is reported in dB per octave. As was the rule with the low-frequency slope, a value of zero was reported for any high-frequency leg with a negative slope.

Values of $Q_{10dB}$ may be calculated using the low- and high-frequency slopes as described above. However, in certain circumstances, these calculations resulted in values that were not representative of the actual tuning (represented by the concept of $Q_{10dB}$). Therefore, the values of $Q_{10dB}$ were calculated independently of the slopes in order to provide a more accurate estimate of the "tuning" of the auditory system at a particular frequency region. As noted above, the value of CF was taken as the masker frequency immediately above the probe tone frequency. The values of $f_2$ and $f_1$ were calculated using a linear regression of two adjacent points which represented the crossing of a fence 10 dB above the masked threshold of the probe in the presence of the CF masker. (The points labeled D and E were used to compute $f_1$ and points G and H to compute $f_2$.) [The values of $Q_{10dB}$ reported in the three volume tabulation of data submitted with the previous report (Hamernik et al., 1988, Report I) do not fix the CF at the masker frequency immediately above the probe frequency. Instead, the CF for those calculations was the (first) lowest masked threshold in the masking function. We feel that the values reported in the appendix of this report are a more accurate estimate of the actual tuning for these probe frequencies than are the figures reported in the volumes of compiled data.]

As noted above, under some circumstances, particularly when a subject had large amounts of PTS, values of $f_2$ and/or $f_1$ could not be estimated accurately. An example of this problem is the case where the masker frequency immediately above CF is unable to mask the probe tone. Therefore, the two points needed for our analysis to compute $f_2$ or $f_1$ do not exist. In this circumstance, $Q_{10dB}$ is not calculated and is defined as "missing data" in subsequent inferential statistical analyses. The lower portion of Figure 10 depicts a tuning curve for which some of the variables can not be computed. The low-frequency slope, computed using a regression line through the points P, Q, and R, is positive and thus a zero slope is assigned. A high-frequency slope however can be computed using points R through V. Although $f_1$

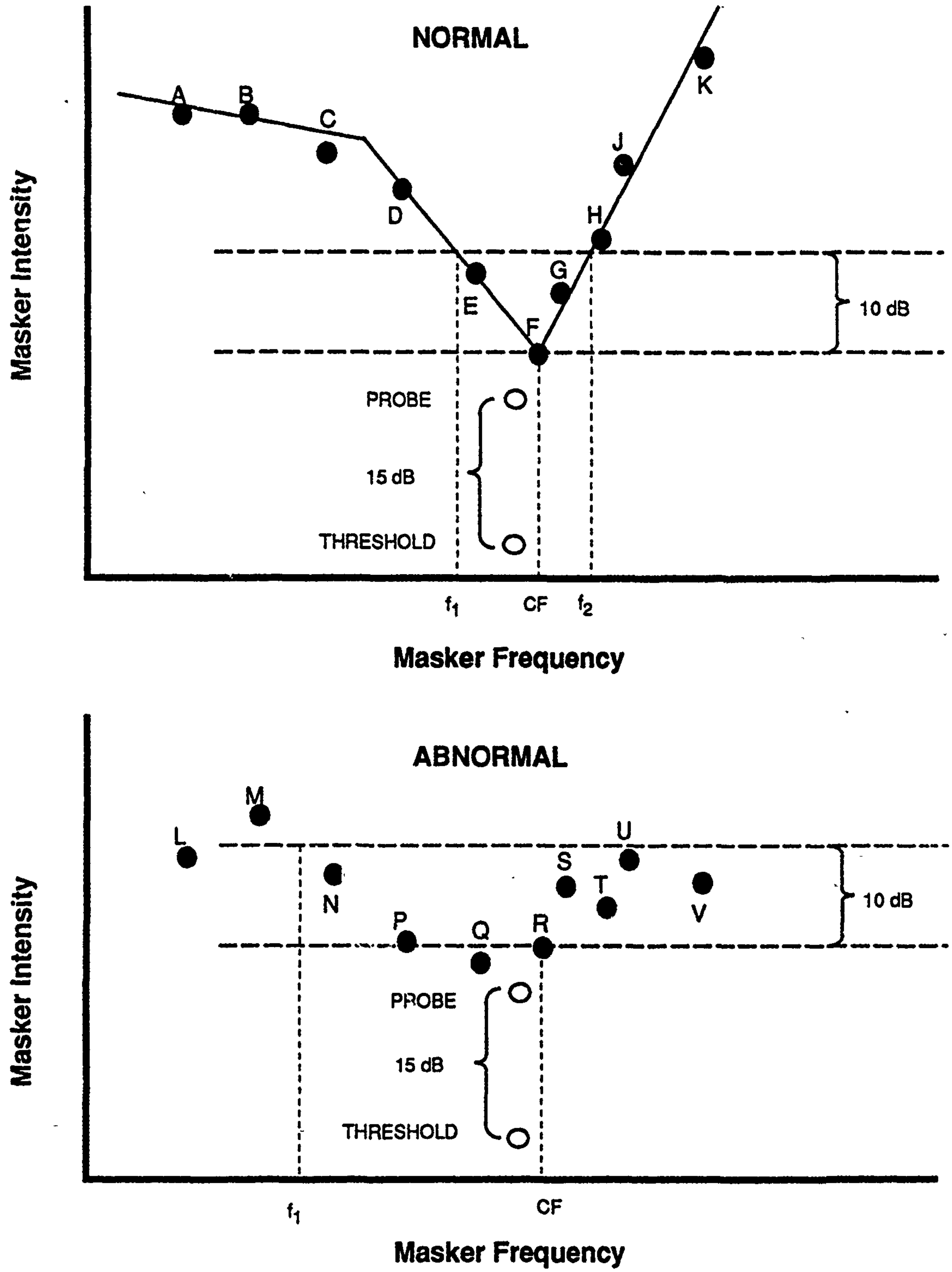



*Figure 10. Idealized tuning curves used to illustrate the calculation of tuning curve statistics.*

can be computed using points M and N, the masking function above CF (point R) does not go above the 10 dB line (fence). Thus, $f_2$ and consequently $Q_{10dB}$ cannot be computed and is thus set to a "missing" data value.

B. Mean Tuning Curves: In addition to the individual TC statistics, mean tuning curves for groups of animals were computed by averaging the masker levels required to just mask the response to the probe presented at 15 dB above threshold. Therefore, the problems caused by measurement error in computing the mean tuning curve variables are minimized or eliminated. The slopes were computed using the same rules as were applied to individual tuning curves. However, the calculations of $Q_{10dB}$ from mean tuning curves differed from those employed for the individual tuning curves. The values $f_1$ and $f_2$ for the mean tuning curves were computed using the regression variables calculated when determining the low- and high-frequency slopes of the mean tuning curve (instead of using only the two points adjacent to the 10 dB fence).

RESULTS: Figure 11 illustrates the mean AEP TC's obtained on 107 chinchillas at the probe frequencies of 0.5, 1.0, 2.0, 4.0, 8.0 & 11.2 kHz. The mean preexposure $Q_{10dB}$'s and the general slopes of these curves are virtually identical to these reported by Salvi et al. (1982) in the chinchilla. The sharpness of tuning increases as the signal frequency is increased and the low and high frequency slopes (LFS & HFS) are steepened. The LFS ranged from 20-50 dB/oct and the HFS ranged from 25-90 dB/oct. These figures are also in general agreement with the published behavioral data on the chinchilla. These three variables however, may not be independent since the calculation of the three variables may use the same data points.

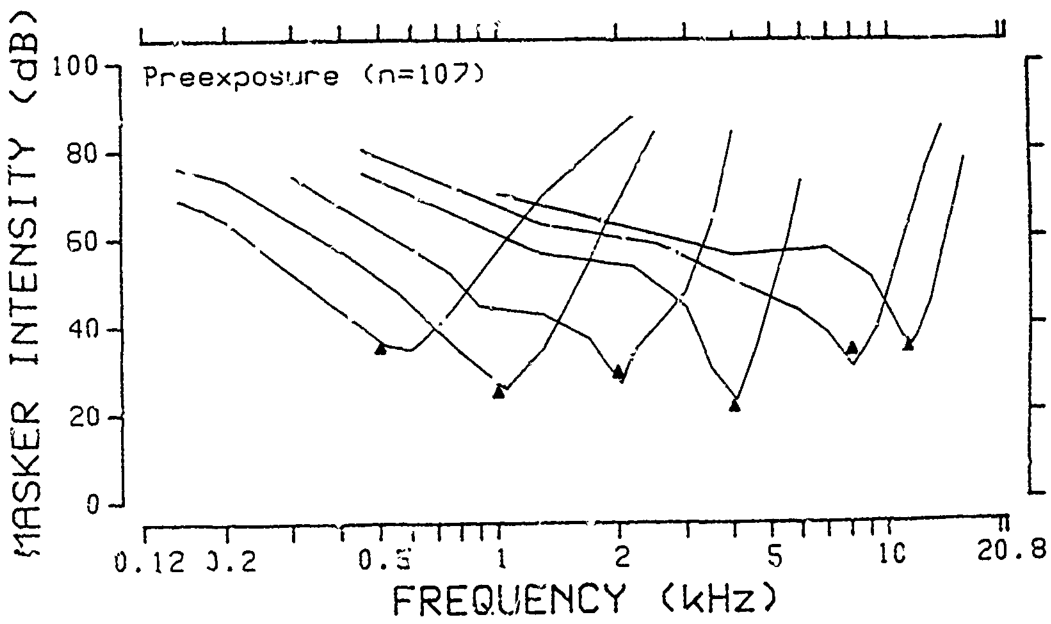



*Figure 11. Mean AEP tuning curves collected from 107 chinchillas.*

To get a visual impression of how the TC's change as PTS increases each animal was segregated at each frequency by the amount of PTS that the animal incurred. Bins containing animals that had PTS of less than 10 dB, between 10-20, 20-30, 30-40 and > 40 dB were formed for each test frequency. These data are shown in Figure 12. The ordinate and abscissa represent the intensity and frequency of a continuous tone that just masks the probe tone which is indicated with a solid symbol. From this figure, we can see the effect of an increasing PTS on the morphology of the mean TC at each probe frequency. When PTS is less than 10 dB, the morphology is identical (namely the $Q_{10dB}$ the HFS and LFS) to the mean preexposure TC. In the 10-20 dB PTS group there is a general elevation of the TC and only a slight reduction in $Q_{10dB}$ however in the 20-30 dB group the TC's are visibly broadened. This broadening is more pronounced in the 30-40 dB group. We can see a clear systematic detuning of the mean TC as the degree of PTS increases. The data from those animals having PTS > 40 dB have not been shown. Beyond 40 dB, the TC's were either flat or beyond the range of the instrumentation's ability to completely mask the probe tone.

It is important to note that the level of the probe tone was fixed at 15 dB SL for both the pre and post exposure TC's. Thus the SPL of the probe could be up to about 50 dB higher in some postexposure animals. Since the probe level may present a confounding variable which can influence TC characteristics, we examined the effects of a high probe level to determine to what extent the morphology of the TC is level dependent. Basically, we need to understand the effect of a high probe level before we can properly evaluate TC's in pathologic cochleas. Figure 13 shows the mean TC variables of the preexposure group and a control group whose TC's were obtained with a 35 dB SL probe tone at each probe frequency. We can see that the higher probe level resulted in either no change in the TC at all or an increase in the sharpness of the TC. Therefore, the changes previously described in the PTS TC's would at most represent an underestimate of the effects of a PTS.

In Figures 14 through 16, the percent change in $Q_{10dB}$ and in the HFS and LFS with sensory cell loss as a function of the degree of PTS at probe frequencies of 1.0, 2.0, 4.0 & 8.0 kHz are shown. The total mean sensory cell loss was determined within the octave band region centered around the probe frequency. It should be noted that the IHC losses are in general very small, being no greater than 20% for PTS of up to 40 dB. However, the OHC shows a near total loss once PTS exceeds roughly 30 dB. Generally, as the amount of PTS increases beyond 10 dB, the percent change in Q increases, reflecting a reduction in $Q_{10dB}$. Also, as the amount of PTS increases beyond 10 dB, the relationship between percent change in $Q_{10dB}$ and sensory cell loss seems to vary somewhat with probe frequency. At the low frequency (i.e. at 0.5 kHz - not shown and 1.0 kHz) $Q_{10dB}$ does not appear to be particularly sensitive to sensory cell loss while at the high frequencies (8.0 kHz and 11.2 kHz not shown) $Q_{10dB}$ appears to be very sensitive to outer hair cell (OHC) losses. At the two mid-frequencies shown, the changes in $Q_{10dB}$ parallel the OHC loss.

The HFS data are shown in Figure 15. The same general trends in the results that were described for $Q_{10dB}$, are seen in the HFS data as PTS increases beyond 10 dB. That is, there is a general decrease in the HFS as PTS increases. At the low frequencies (1.0 kHz and below) the HFS slope seems relatively insensitive to the OHC loss while at the three higher frequencies the HFS seems to parallel the OHC loss.

Similarly for the LFS data, illustrated in Figure 16, as PTS increases the LFS decreases. At the 1.0, 2.0 and 4.0 kHz test frequencies, the LFS parallels the OHC loss,

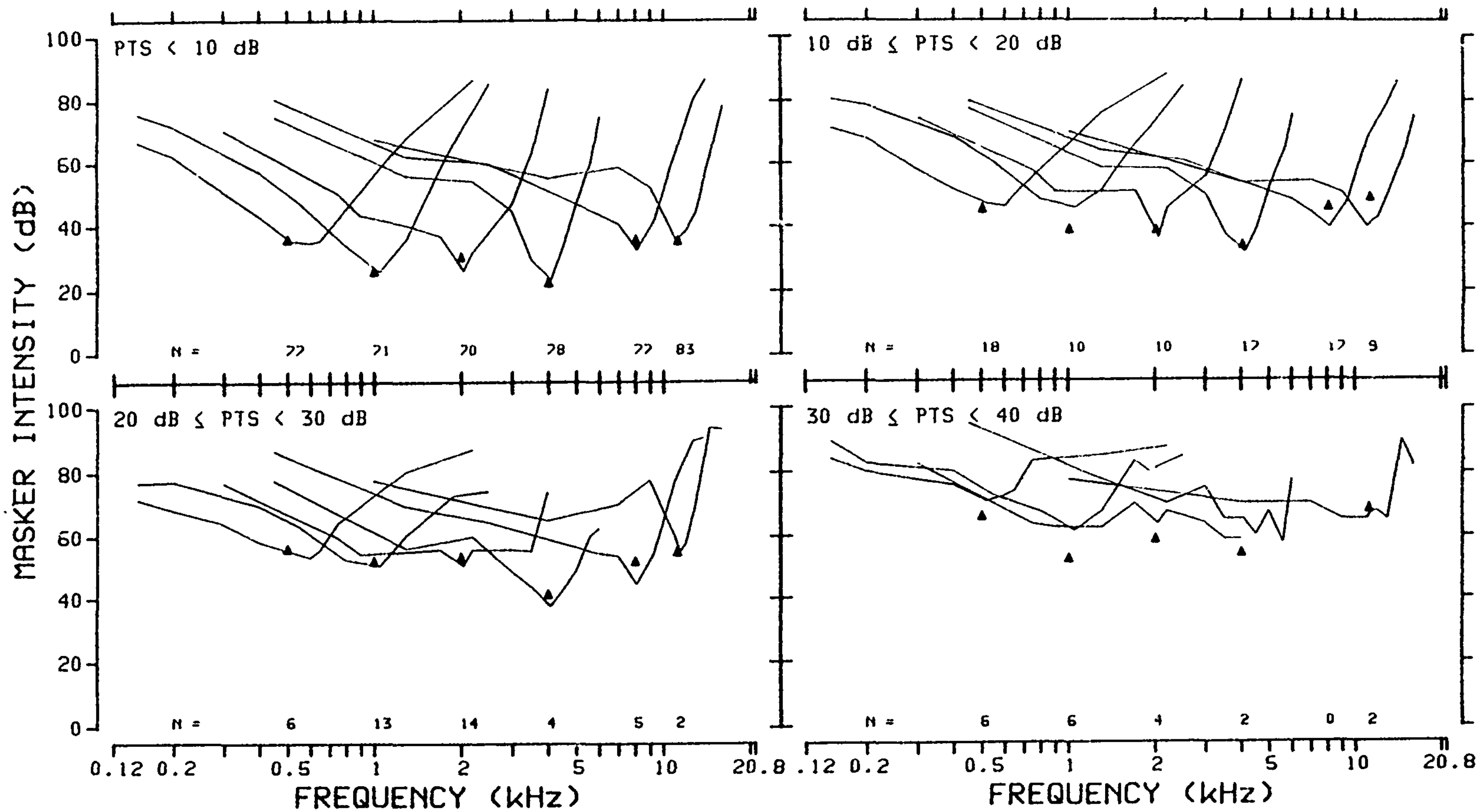



*Figure 12. Mean AEP tuning curves segregated by amount of PTS.*

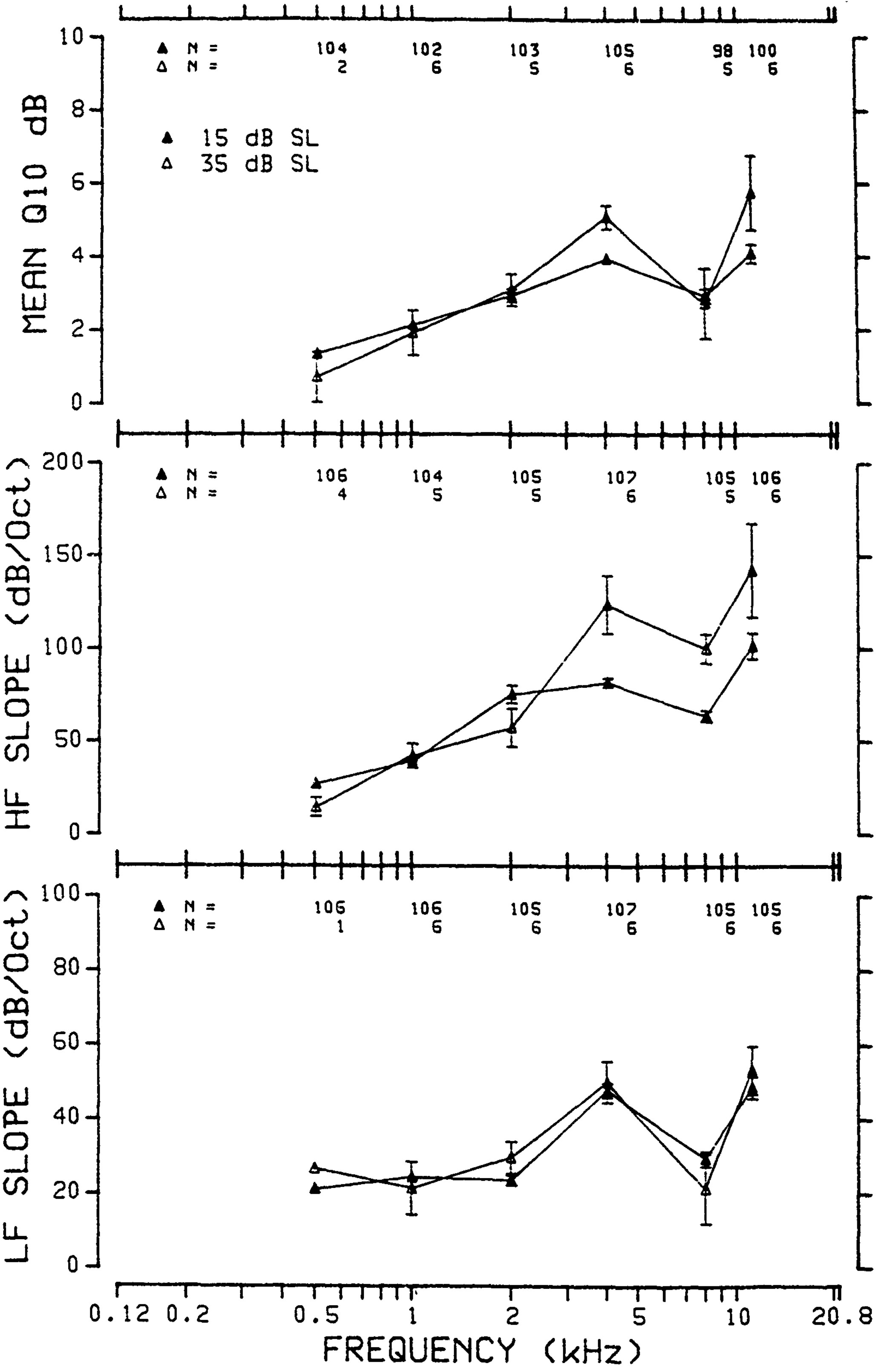



*Figure 13. Comparison of the tuning curve statistics for probe tones presented at 15 and 35 dB above threshold. Upper panel illustrates $Q_{10dB}$; center panel illustrates high frequency slope; and lower panel illustrates low frequency slope.*

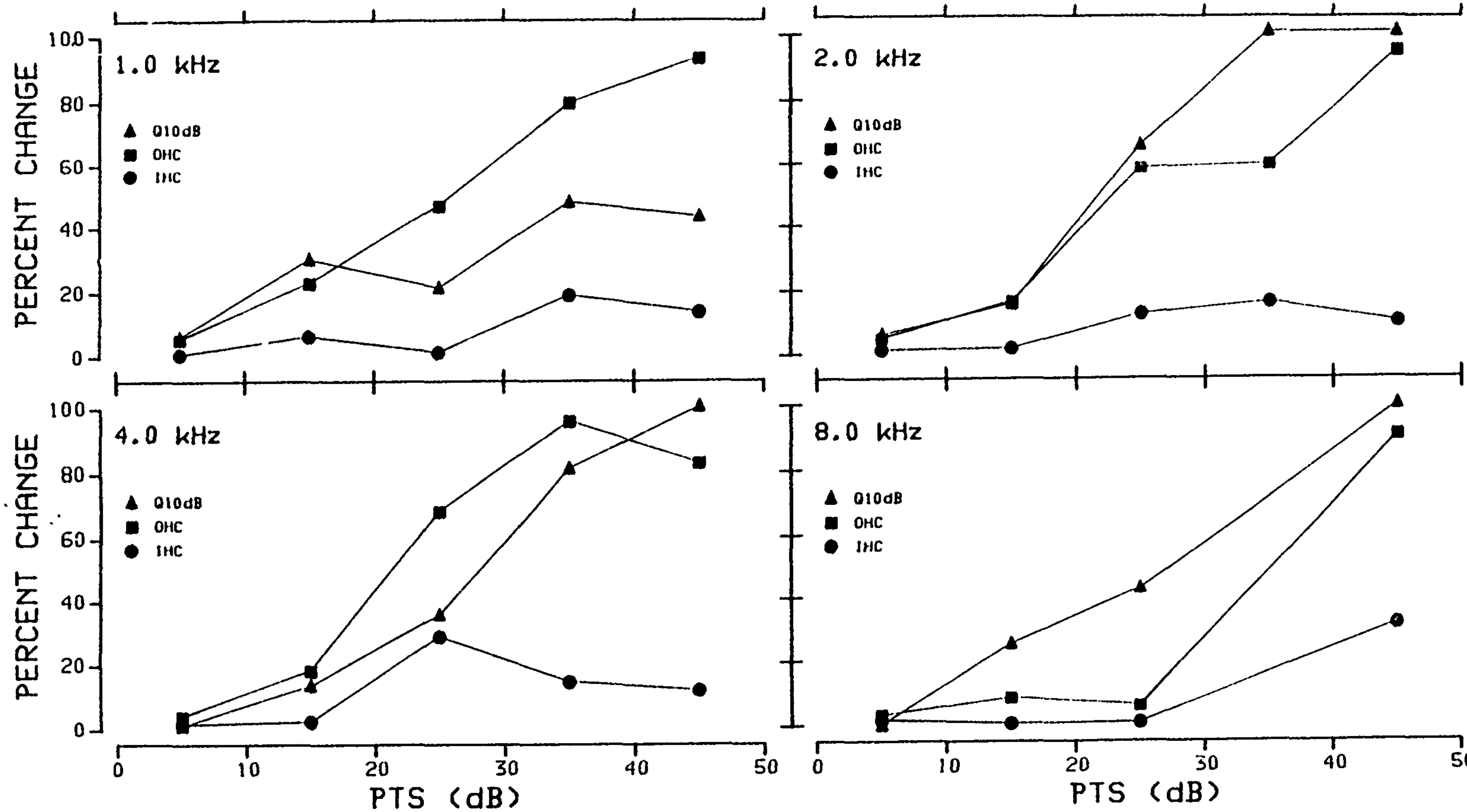



*Figure 14. Percent change in $Q_{10dB}$ and sensory cell loss as a consequence of increased PTS.*

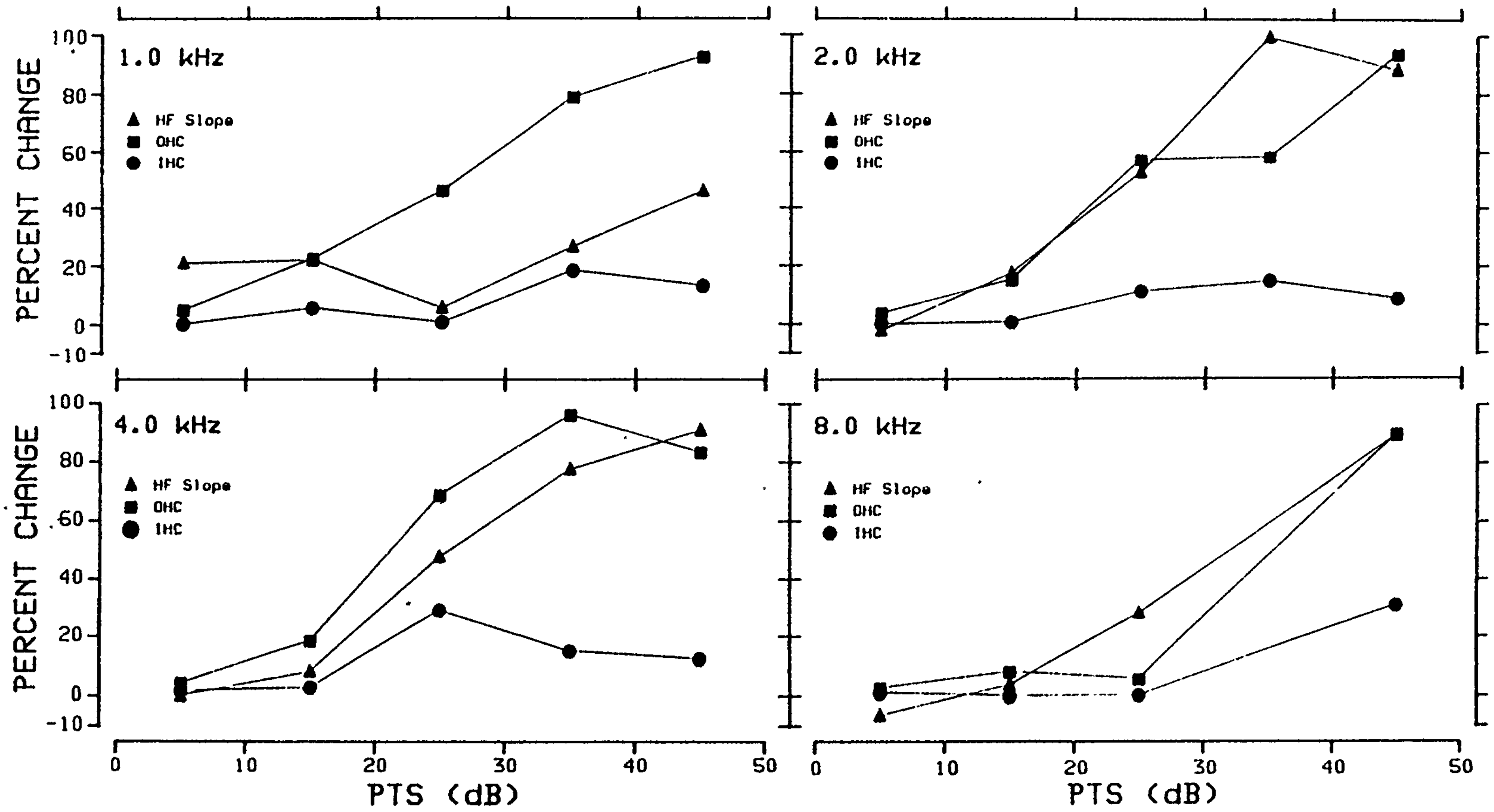



*Figure 15. Percent change in high frequency slope and sensory cell loss as a consequence of increased PTS.*

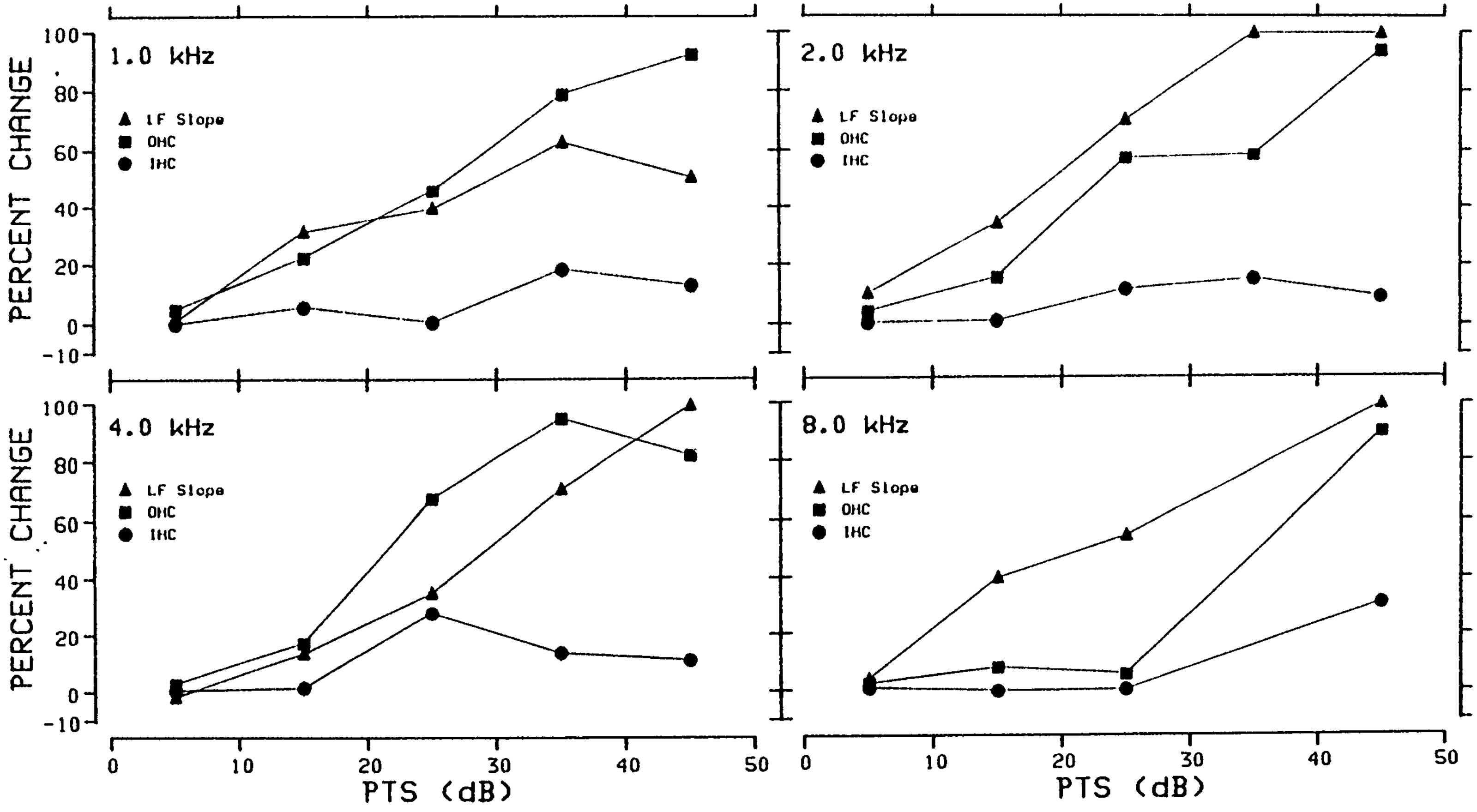



Figure 16. Percent change in low frequency slope and sensory cell loss as a consequence of increased PTS

while at the higher test frequency (8.0 kHz) the LFS seems very insensitive to the condition of the cochlea.

CONCLUSIONS: From the results obtained from the evoked potential tuning curves, the following conclusions may be made:

1. When PTS is below 10 dB, there is little sensory cell damage and no measurable change in the evoked potential TC morphology.

2. There is a systematic change in the 3 variables used to quantify the tuning curve (i.e. $Q_{10dB}$, low and high frequency slope) as PTS increases above 10 dB.

3. Changes in TC characteristics at the 2.0 and 4.0 kHz frequencies are highly correlated with OHC losses. At the lower (0.5 and 1.0 kHz) and higher (8.0 & 11.2 kHz) test frequencies the relation is not as straight forward.

4. When PTS exceeds 40 dB, there is a complete loss of OHC and tuning is essentially eliminated.

A complete summary of the tuning curve data that were used in developing these results are enclosed in the Appendix of this report. These turning curve figures supercede those that are tabulated in the three volumes of compiled data included with the previous report (Hamernik et al., 1988, Report I). The Appendix data reflect values obtained with the new TC protocol that was described above. The new rules that we recently incorporated do not yield the types of inconsistencies that were found in the calculation of the original TC data.

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# Appendix

## Individual and Group Tuning Curve Statistics from:

The Effects of Blast Trauma (Impulse Noise)
on Hearing: A Parametric Study

150 dB 1X

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 2071 | 1.659 | 30.2 | 18.6 | 1.659 | 31.8 | 25.0 | 0.0 |
| 2073 | 1.288 | 23.1 | 19.0 | 1.744 | 20.6 | 18.8 | 1.2 |
| 2084 | 0.587 | 21.8 | 12.6 | 1.129 | 20.1 | 38.0 | -14.2 |
| 2090 | 0.707 | 14.8 | 25.6 | 3.613 | 33.0 | 31.2 | -1.7 |
| Mean | 1.060 | 22.5 | 18.9 | 2.036 | 26.4 | 28.2 | -3.6 |
| S.D. | 0.503 | 6.3 | 5.3 | 1.086 | 7.0 | 8.2 | 7.1 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 2071 | 1.768 | 47.0 | 21.8 | 1.779 | 56.2 | 21.3 | -1.7 |
| 2073 | 1.316 | 37.4 | 19.0 | 2.100 | 33.3 | 15.7 | -2.5 |
| 2084 | 2.100 | 49.5 | 21.3 | 2.100 | 51.1 | 26.9 | -7.5 |
| 2090 | 1.837 | 48.8 | 21.3 | 1.983 | 51.9 | 22.9 | -5.0 |
| Mean | 1.755 | 45.7 | 20.8 | 1.991 | 48.1 | 21.7 | -4.2 |
| S.D. | 0.326 | 5.6 | 1.2 | 0.151 | 10.2 | 4.6 | 2.6 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 2071 | 1.577 | 17.2 | 38.1 | 4.100 | 62.0 | 30.1 | -3.3 |
| 2073 | 1.615 | 38.9 | 15.1 | 3.253 | 53.9 | 21.2 | -1.0 |
| 2084 | 6.041 | 59.6 | 13.3 | 1.615 | 68.1 | 15.1 | -4.2 |
| 2090 | 1.799 | 76.4 | 16.8 | 1.244 | 64.5 | 31.9 | -10.0 |
| Mean | 2.758 | 48.0 | 20.8 | 2.553 | 62.2 | 24.6 | -4.6 |
| S.D. | 2.191 | 25.6 | 11.6 | 1.351 | 6.0 | 7.9 | 3.8 |

150 dB 1X

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 2071 | 3.654 | 116.3 | 33.2 | 2.733 | 87.8 | 22.1 | -3.3 |
| 2073 | 2.285 | 85.3 | 11.0 | 3.009 | 85.7 | 22.1 | -1.7 |
| 2084 | 3.489 | 111.0 | 44.3 | 2.474 | 92.4 | 10.9 | -2.1 |
| 2090 | 3.255 | 87.7 | 33.2 | 3.532 | 91.4 | 22.3 | -1.7 |
| Mean | 3.170 | 100.1 | 30.4 | 2.937 | 89.3 | 19.3 | -2.2 |
| S.D. | 0.613 | 15.9 | 13.9 | 0.453 | 3.1 | 5.7 | 0.8 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 2071 | 0.975 | 48.5 | 0.0 | 1.007 | 76.8 | 0.0 | -3.3 |
| 2073 | 1.484 | 72.3 | 11.2 | 3.001 | 80.6 | 21.3 | 4.2 |
| 2084 | 3.522 | 50.2 | 21.3 | 5.286 | 66.3 | 9.5 | 6.2 |
| 2090 | 2.132 | 70.5 | 21.8 | 2.002 | 56.2 | 21.8 | 1.7 |
| Mean | 2.028 | 60.4 | 13.6 | 2.824 | 70.0 | 13.1 | 2.2 |
| S.D. | 1.102 | 12.7 | 10.3 | 1.832 | 11.0 | 10.4 | 4.1 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 2071 | 2.431 | 103.4 | 30.2 | 2.793 | 81.0 | 50.6 | -10.0 |
| 2073 | 4.137 | 83.5 | 50.6 | 5.116 | 134.7 | 65.7 | -10.8 |
| 2084 | ****** | 115.1 | 0.0 | 3.581 | 110.2 | 88.3 | -0.7 |
| 2090 | 3.799 | 55.3 | 50.6 | 4.531 | 104.0 | 70.2 | 1.7 |
| Mean | 3.456 | 89.3 | 32.8 | 4.005 | 107.5 | 68.7 | -5.0 |
| S.D. | 0.903 | 26.2 | 23.9 | 1.026 | 22.1 | 15.5 | 6.4 |

150 dB 10X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0510 | 1.659 | 18.1 | 25.0 | 1.345 | 48.5 | 25.4 | 0.0 |
| 0511 | 1.345 | 21.9 | 25.4 | 0.865 | 19.4 | 12.6 | -1.7 |
| 0512 | 1.486 | 37.1 | 25.2 | 3.182 | 53.6 | 37.8 | -5.0 |
| 0513 | 1.284 | 26.3 | 6.8 | 0.968 | 24.9 | 12.6 | 3.3 |
| 0524 | 1.486 | 25.5 | 18.8 | 1.038 | 15.2 | 18.8 | 0.0 |
| Mean | 1.452 | 25.8 | 20.2 | 1.480 | 32.3 | 21.4 | -0.7 |
| S.D. | 0.146 | 7.1 | 8.0 | 0.968 | 17.5 | 10.6 | 3.0 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0510 | 4.635 | 71.3 | 19.6 | 3.136 | 63.5 | 31.9 | -3.3 |
| 0511 | 2.476 | 44.4 | 26.3 | 1.664 | 47.7 | 27.4 | 0.0 |
| 0512 | 1.664 | 60.1 | 27.4 | 4.532 | 84.9 | 20.7 | 8.3 |
| 0513 | 2.100 | 53.2 | 26.9 | 3.591 | 50.3 | 31.9 | 0.0 |
| 0524 | 1.081 | 40.8 | 27.4 | 2.079 | 68.0 | 25.7 | 6.7 |
| Mean | 2.391 | 54.0 | 25.5 | 3.000 | 62.9 | 27.5 | 2.3 |
| S.D. | 1.357 | 12.3 | 3.4 | 1.156 | 15.0 | 4.7 | 4.9 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0510 | 3.199 | 57.9 | 30.1 | 1.615 | 45.9 | 15.1 | -5.0 |
| 0511 | 0.932 | 15.9 | 16.0 | 5.249 | 54.9 | 29.2 | 2.9 |
| 0512 | 2.699 | 61.4 | 21.2 | 1.577 | 33.9 | 6.2 | 3.3 |
| 0513 | 4.100 | 50.7 | 38.1 | 2.112 | 68.2 | 30.1 | -6.7 |
| 0524 | 2.278 | 58.0 | 16.0 | 2.288 | 48.7 | 29.2 | 5.0 |
| Mean | 2.641 | 48.8 | 24.3 | 2.568 | 50.3 | 22.0 | -0.1 |
| S.D. | 1.172 | 18.8 | 9.7 | 1.530 | 12.6 | 10.8 | 5.3 |

150 dB 10X 10/M

## INDIVIDUAL TUNING CURVE STATISTICS

### Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0510 | 4.100 | 134.2 | 88.6 | 5.059 | 120.1 | 88.7 | -3.3 |
| 0511 | 2.980 | 91.4 | 55.3 | 3.171 | 76.6 | 55.3 | 0.0 |
| 0512 | 3.766 | 76.8 | 77.4 | 3.706 | 94.5 | 66.4 | 0.0 |
| 0513 | 3.255 | 124.0 | 33.2 | 3.621 | 124.2 | 55.3 | 1.7 |
| 0524 | 4.100 | 111.6 | 55.4 | 3.171 | 115.4 | 55.3 | 8.3 |
| Mean | 3.640 | 107.6 | 62.0 | 3.745 | 106.1 | 64.2 | 1.3 |
| S.D. | 0.506 | 23.5 | 21.6 | 0.775 | 20.1 | 14.5 | 4.3 |

### Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0510 | 3.880 | 69.2 | 31.3 | 5.993 | 114.4 | 31.3 | 0.0 |
| 0511 | 2.132 | 76.7 | 22.4 | 3.721 | 92.5 | 9.5 | 6.7 |
| 0512 | 3.522 | 103.4 | 10.1 | 2.750 | 94.7 | 21.3 | 6.7 |
| 0513 | 1.799 | 35.0 | 21.8 | 3.880 | 100.8 | 31.3 | 0.0 |
| 0524 | 1.673 | 65.1 | 33.0 | 3.514 | 68.6 | 42.5 | 10.0 |
| Mean | 2.601 | 69.9 | 23.7 | 3.971 | 94.2 | 27.2 | 4.7 |
| S.D. | 1.025 | 24.6 | 9.2 | 1.211 | 16.6 | 12.4 | 4.5 |

### Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0510 | 4.531 | 112.1 | 70.2 | 2.695 | 72.1 | 50.6 | 0.0 |
| 0511 | 15.385 | 90.9 | 49.8 | 11.497 | 142.5 | 34.7 | 0.0 |
| 0512 | 2.511 | 86.3 | 30.2 | 7.287 | 102.5 | 44.5 | -1.7 |
| 0513 | 8.945 | 104.2 | 70.2 | 2.531 | 106.8 | 46.1 | 0.0 |
| 0524 | 7.475 | 98.3 | 70.2 | 3.405 | 40.1 | 45.3 | 6.7 |
| Mean | 7.769 | 98.4 | 58.1 | 5.483 | 92.8 | 44.2 | 1.0 |
| S.D. | 4.940 | 10.3 | 17.9 | 3.880 | 38.6 | 5.8 | 3.2 |

150 dB 10X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1010 | 1.176 | 40.9 | 0.0 | 2.126 | 31.0 | 17.6 | 11.7 |
| 1094 | 1.317 | 17.3 | 5.2 | 2.311 | 31.3 | 17.4 | 8.3 |
| 1104 | 0.679 | 19.2 | 11.2 | 2.311 | 23.0 | 30.2 | 11.7 |
| 1128 | 1.960 | 28.0 | 17.6 | 1.219 | 16.9 | 5.2 | -5.0 |
| 1231 | 1.082 | 30.1 | 16.3 | 1.507 | 20.8 | 10.1 | -3.3 |
| Mean | 1.243 | 27.1 | 10.1 | 1.895 | 24.6 | 16.1 | 4.7 |
| S.D. | 0.466 | 9.5 | 7.5 | 0.502 | 6.4 | 9.4 | 8.2 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1010 | 4.123 | 54.9 | 34.8 | 1.837 | 63.0 | 15.2 | 6.7 |
| 1094 | 2.412 | 31.0 | 19.7 | 1.185 | 25.2 | 21.4 | 10.0 |
| 1104 | 1.334 | 29.5 | 43.2 | 1.795 | 51.8 | 26.4 | 8.3 |
| 1128 | 2.412 | 53.0 | 30.9 | 2.706 | 49.7 | 25.8 | 1.7 |
| 1231 | 1.536 | 46.0 | 23.4 | 1.353 | 37.2 | 17.2 | 3.3 |
| Mean | 2.363 | 42.9 | 30.4 | 1.775 | 45.4 | 21.2 | 6.0 |
| S.D. | 1.101 | 12.0 | 9.3 | 0.591 | 14.5 | 5.0 | 3.5 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1010 | 10.577 | 60.9 | 55.1 | 6.304 | 33.4 | 41.8 | 8.3 |
| 1094 | 0.826 | 26.9 | 0.5 | 1.535 | 41.5 | 3.7 | 5.0 |
| 1104 | 2.702 | 49.7 | 20.6 | 2.531 | 24.7 | 20.6 | -1.7 |
| 1128 | 6.311 | 30.3 | 32.9 | 0.702 | 11.7 | 12.6 | -5.0 |
| 1231 | 4.993 | 28.4 | 20.2 | 7.382 | 70.5 | 51.2 | -3.3 |
| Mean | 5.082 | 39.2 | 25.9 | 3.691 | 36.4 | 26.0 | 0.7 |
| S.D. | 3.725 | 15.2 | 20.0 | 2.974 | 22.1 | 19.9 | 5.7 |

150 dB 10X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1010 | 7.245 | 108.0 | 80.0 | 2.292 | 71.1 | 24.3 | 8.3 |
| 1094 | 2.583 | 68.6 | 24.5 | 1.678 | 64.1 | 2.0 | 11.7 |
| 1104 | 4.828 | 93.5 | 57.6 | 3.520 | 68.7 | 46.6 | 6.7 |
| 1128 | 2.316 | 70.0 | 15.4 | 3.322 | 110.4 | 24.5 | 5.0 |
| 1231 | 5.938 | 67.5 | 66.6 | 1.603 | 59.2 | 0.0 | 1.7 |
| Mean | 4.582 | 81.5 | 48.8 | 2.523 | 74.7 | 19.5 | 6.7 |
| S.D. | 2.128 | 18.3 | 27.7 | 0.950 | 20.5 | 19.1 | 3.7 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1010 | ****** | 90.6 | ****** | 7.527 | 84.8 | 27.2 | 10.0 |
| 1094 | 4.376 | 73.0 | 37.8 | 0.834 | 53.5 | 7.1 | 10.0 |
| 1104 | 2.866 | 65.9 | 28.9 | 4.412 | 45.1 | 38.9 | -3.3 |
| 1128 | 5.144 | 63.7 | 60.8 | 5.672 | 70.7 | 60.2 | 11.7 |
| 1231 | ****** | 30.1 | 85.5 | 2.912 | 24.5 | 47.3 | 16.0 |
| Mean | 4.129 | 64.7 | 53.2 | 4.272 | 55.7 | 36.1 | 8.9 |
| S.D. | 1.159 | 22.0 | 25.3 | 2.562 | 23.3 | 20.2 | 7.2 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1010 | 3.833 | 98.9 | 28.1 | 2.441 | 83.3 | 8.5 | 3.3 |
| 1094 | 3.215 | 86.3 | 59.0 | 3.393 | 95.0 | 48.5 | 1.7 |
| 1104 | 3.364 | 78.4 | 48.5 | 4.602 | 53.3 | 62.8 | -1.7 |
| 1128 | 2.944 | 86.9 | 33.4 | 2.462 | 45.4 | 48.5 | -1.7 |
| 1231 | 9.378 | 98.0 | 35.5 | 8.461 | 60.9 | 50.6 | 8.3 |
| Mean | 4.547 | 89.7 | 40.9 | 4.272 | 67.6 | 43.7 | 2.0 |
| S.D. | 2.720 | 8.7 | 12.6 | 2.503 | 20.9 | 20.6 | 4.1 |

150 dB 10X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| Animal | PREEXPOSURE Q10dB | PREEXPOSURE HF Slope | PREEXPOSURE LF Slope | POSTEXPOSURE Q10dB | POSTEXPOSURE HF Slope | POSTEXPOSURE LF Slope | PTS |
|---|---|---|---|---|---|---|---|
| 0502 | 1.553 | 36.6 | 25.4 | 1.486 | 26.0 | 25.2 | -6.7 |
| 0504 | 1.118 | 30.7 | 19.0 | 1.017 | 32.8 | 12.8 | 0.0 |
| 0505 | 1.011 | 33.2 | 19.0 | 1.325 | 44.9 | 18.8 | -1.7 |
| 0507 | 2.600 | 33.3 | 25.2 | 1.156 | 22.9 | 12.8 | -5.0 |
| 0509 | 1.345 | 31.7 | 25.4 | 0.885 | 20.1 | 12.4 | 10.0 |
| Mean | 1.526 | 33.1 | 22.8 | 1.174 | 29.3 | 16.4 | -0.7 |
| S.D. | 0.636 | 2.2 | 3.5 | 0.239 | 9.9 | 5.6 | 6.5 |

Probe Frequency 1.0 kHz

| Animal | PREEXPOSURE Q10dB | PREEXPOSURE HF Slope | PREEXPOSURE LF Slope | POSTEXPOSURE Q10dB | POSTEXPOSURE HF Slope | POSTEXPOSURE LF Slope | PTS |
|---|---|---|---|---|---|---|---|
| 0502 | 2.100 | 37.7 | 21.3 | 2.476 | 52.7 | 26.3 | 0.0 |
| 0504 | 1.689 | 48.0 | 26.9 | 2.557 | 54.8 | 32.5 | -3.3 |
| 0505 | 1.768 | 45.3 | 21.8 | 2.557 | 43.5 | 21.3 | 0.0 |
| 0507 | 1.837 | 48.6 | 21.3 | 1.779 | 37.4 | 26.9 | 0.0 |
| 0509 | 2.476 | 40.0 | 20.7 | 3.136 | 46.5 | 37.5 | 1.7 |
| Mean | 1.974 | 43.9 | 22.4 | 2.501 | 47.0 | 28.9 | -0.3 |
| S.D. | 0.320 | 4.8 | 2.5 | 0.483 | 7.0 | 6.2 | 1.8 |

Probe Frequency 2.0 kHz

| Animal | PREEXPOSURE Q10dB | PREEXPOSURE HF Slope | PREEXPOSURE LF Slope | POSTEXPOSURE Q10dB | POSTEXPOSURE HF Slope | POSTEXPOSURE LF Slope | PTS |
|---|---|---|---|---|---|---|---|
| 0502 | 3.026 | 62.1 | 14.2 | 1.590 | 42.7 | 23.0 | -3.3 |
| 0504 | 1.894 | 40.2 | 23.0 | 2.190 | 62.7 | 31.0 | 0.0 |
| 0505 | 1.615 | 35.2 | 15.1 | ****** | 8.3 | 0.9 | 5.0 |
| 0507 | 1.753 | 58.6 | 7.1 | 1.173 | 35.6 | 7.1 | 6.7 |
| 0509 | 2.445 | 38.3 | 20.4 | 0.866 | 31.5 | 7.1 | 8.3 |
| Mean | 2.147 | 46.9 | 15.9 | 1.455 | 36.2 | 13.8 | 3.3 |
| S.D. | 0.584 | 12.5 | 6.2 | 0.573 | 19.6 | 12.6 | 4.9 |

150 dB 10X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0502 | 2.522 | 99.3 | 33.0 | 3.129 | 78.9 | 55.5 | -1.7 |
| 0504 | 2.890 | 84.8 | 44.3 | 4.100 | 90.2 | 66.5 | -3.3 |
| 0505 | 3.056 | 91.8 | 33.1 | 2.890 | 99.6 | 44.3 | 0.0 |
| 0507 | 3.435 | 84.5 | 44.4 | 3.660 | 104.7 | 55.4 | 0.0 |
| 0509 | 3.056 | 70.3 | 33.1 | 2.352 | 74.0 | 22.0 | 3.3 |
| Mean | 2.992 | 86.1 | 37.6 | 3.226 | 89.5 | 48.7 | -0.3 |
| S.D. | 0.330 | 10.7 | 6.1 | 0.678 | 13.1 | 16.9 | 2.5 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0502 | 1.233 | 48.9 | 10.6 | 1.664 | 74.0 | 11.2 | -5.0 |
| 0504 | 3.001 | 84.7 | 21.3 | 5.291 | 94.9 | 40.8 | -4.6 |
| 0505 | 4.576 | 91.8 | 20.1 | 4.576 | 91.8 | 8.9 | 0.0 |
| 0507 | 4.152 | 66.7 | 31.9 | 4.824 | 67.7 | 10.1 | 6.7 |
| 0509 | 1.459 | 68.6 | 0.0 | 1.088 | 66.9 | 0.0 | 6.7 |
| Mean | 2.884 | 72.1 | 16.8 | 3.489 | 79.1 | 14.2 | 0.7 |
| S.D. | 1.520 | 16.8 | 12.0 | 1.956 | 13.4 | 15.5 | 5.7 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0502 | 1.586 | 48.5 | 5.3 | 1.451 | 43.5 | 16.6 | 0.0 |
| 0504 | 5.670 | 163.6 | 70.2 | 4.843 | 135.5 | 60.4 | -3.7 |
| 0505 | 3.771 | 116.2 | 40.0 | 5.750 | 112.1 | 64.9 | 0.0 |
| 0507 | 4.471 | 151.4 | 65.7 | 5.750 | 129.5 | 64.9 | 0.0 |
| 0509 | 2.566 | 84.5 | 35.5 | 5.609 | 110.5 | 60.4 | 0.0 |
| Mean | 3.613 | 112.8 | 43.3 | 4.681 | 106.2 | 53.4 | -0.7 |
| S.D. | 1.597 | 47.5 | 26.2 | 1.845 | 36.7 | 20.7 | 1.7 |

150 dB 100X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0525 | 3.182 | 25.4 | 31.4 | 0.836 | 28.2 | 12.6 | 1.7 |
| 0528 | 1.288 | 24.2 | 25.6 | 1.651 | 38.6 | 25.2 | 5.0 |
| 0530 | 1.011 | 21.9 | 19.0 | 1.298 | 25.9 | 44.2 | -3.3 |
| 0536 | 2.436 | 39.9 | 31.4 | 2.198 | 5.1 | 25.4 | 1.7 |
| 0538 | 1.288 | 39.1 | 19.0 | 1.713 | 34.8 | 19.0 | 5.0 |
| Mean | 1.841 | 30.1 | 25.3 | 1.539 | 26.5 | 25.3 | 2.0 |
| S.D. | 0.929 | 8.7 | 6.2 | 0.507 | 13.0 | 11.8 | 3.4 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0525 | 3.570 | 50.7 | 36.9 | 2.476 | 38.6 | 15.1 | -1.7 |
| 0528 | 4.170 | 47.7 | 31.3 | 4.170 | 64.9 | 31.3 | 3.3 |
| 0530 | 3.570 | 77.5 | 48.1 | 3.136 | 61.8 | 31.9 | 0.0 |
| 0536 | 2.371 | 82.0 | 31.3 | 1.467 | 52.7 | 21.8 | 0.0 |
| 0538 | 2.371 | 60.1 | 25.7 | 3.570 | 53.2 | 31.3 | 3.3 |
| Mean | 3.210 | 63.6 | 34.7 | 2.964 | 54.2 | 26.3 | 1.0 |
| S.D. | 0.804 | 15.5 | 8.5 | 1.040 | 10.2 | 7.5 | 2.2 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0525 | 2.593 | 46.6 | 22.1 | 4.568 | 44.1 | 22.1 | 0.0 |
| 0528 | 2.596 | 68.7 | 39.9 | 3.579 | 58.4 | 36.3 | 13.3 |
| 0530 | 2.042 | 48.6 | 23.0 | 1.894 | 38.9 | 23.0 | -6.7 |
| 0536 | 2.082 | 71.5 | 23.0 | 2.077 | 60.0 | 15.1 | -3.3 |
| 0538 | 2.415 | 54.0 | 15.1 | 6.153 | 65.1 | 12.4 | -1.7 |
| Mean | 2.345 | 57.9 | 24.6 | 3.654 | 53.3 | 21.8 | 0.3 |
| S.D. | 0.269 | 11.5 | 9.2 | 1.780 | 11.2 | 9.3 | 7.7 |

150 dB 100X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0525 | 3.390 | 81.1 | 55.2 | 6.294 | 90.2 | 77.8 | -1.7 |
| 0528 | 6.093 | 83.3 | 77.6 | 6.093 | 98.9 | 66.6 | 6.7 |
| 0530 | 4.100 | 103.4 | 66.5 | 6.093 | 97.2 | 77.6 | -11.7 |
| 0536 | 3.236 | 111.3 | 66.4 | 4.754 | 107.0 | 77.5 | 5.0 |
| 0538 | 5.059 | 126.6 | 88.7 | 3.297 | 101.7 | 55.4 | 0.0 |
| Mean | 4.376 | 101.1 | 70.9 | 5.306 | 99.0 | 71.0 | -0.3 |
| S.D. | 1.200 | 19.2 | 12.7 | 1.280 | 6.1 | 9.9 | 7.2 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0525 | 6.528 | 88.9 | 30.7 | 3.982 | 103.3 | 53.7 | 3.3 |
| 0528 | 3.159 | 62.6 | 32.5 | 3.522 | 50.2 | 21.3 | 15.0 |
| 0530 | 5.286 | 88.4 | 54.3 | 5.286 | 103.1 | 20.7 | -1.7 |
| 0536 | 2.717 | 56.1 | 21.8 | 4.576 | 88.7 | 42.5 | -1.7 |
| 0538 | 1.233 | 80.0 | 11.2 | 3.735 | 80.0 | 31.3 | -1.7 |
| Mean | 3.785 | 75.2 | 30.1 | 4.220 | 85.1 | 33.9 | 2.7 |
| S.D. | 2.111 | 15.1 | 15.9 | 0.715 | 21.9 | 14.2 | 7.2 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0525 | 3.789 | 91.0 | 45.3 | 3.771 | 86.7 | 40.0 | -6.7 |
| 0528 | 11.497 | 98.1 | 49.8 | 3.612 | 84.1 | 61.2 | 3.3 |
| 0530 | 3.046 | 99.4 | 50.6 | 7.700 | 110.9 | 14.3 | 0.0 |
| 0536 | 5.223 | 98.9 | 90.6 | 3.168 | 80.0 | 80.8 | 3.3 |
| 0538 | 3.372 | 97.2 | 80.8 | 4.728 | 112.7 | 85.3 | 1.7 |
| Mean | 5.385 | 97.0 | 63.4 | 4.595 | 94.9 | 56.3 | 0.3 |
| S.D. | 3.516 | 3.4 | 20.7 | 1.826 | 15.7 | 29.5 | 4.2 |

150 dB 100X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1365 | 2.193 | 33.7 | 18.8 | 1.987 | 28.3 | 25.0 | 21.7 |
| 1448 | ****** | 13.0 | 18.8 | 1.300 | 31.7 | 18.8 | -1.7 |
| 1510 | 0.757 | 26.6 | 12.6 | 0.997 | 32.3 | 18.8 | -1.7 |
| 1539 | ****** | ****** | ****** | ****** | ****** | ****** | 28.3 |
| 1564 | ****** | 0.0 | 6.2 | 0.766 | 22.8 | 6.2 | 3.3 |
| 1597 | 0.745 | 21.3 | 6.0 | 1.227 | 16.8 | 12.6 | 30.8 |
| Mean | 1.232 | 18.9 | 12.5 | 1.255 | 26.4 | 16.3 | 13.5 |
| S.D. | 0.833 | 13.0 | 6.3 | 0.460 | 6.6 | 7.1 | 15.2 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1365 | 2.100 | 52.3 | 21.3 | 1.698 | 36.4 | 10.6 | 23.3 |
| 1448 | ****** | ****** | 10.6 | 1.589 | 47.5 | 10.6 | 3.3 |
| 1510 | 2.557 | 34.2 | 21.3 | 1.649 | 41.1 | 16.2 | 1.7 |
| 1539 | ****** | ****** | ****** | ****** | ****** | ****** | 21.7 |
| 1564 | ****** | ****** | 8.1 | ****** | 14.3 | 1.7 | 18.3 |
| 1597 | 1.578 | 44.0 | 21.8 | 1.275 | 8.2 | 16.2 | 21.7 |
| Mean | 2.078 | 43.5 | 16.6 | 1.553 | 29.5 | 11.1 | 15.0 |
| S.D. | 0.490 | 9.1 | 6.7 | 0.190 | 17.2 | 5.9 | 9.8 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1365 | ****** | ****** | ****** | 9.252 | 48.2 | 27.4 | 20.0 |
| 1448 | 5.339 | 49.2 | 29.7 | 3.579 | 81.7 | 40.3 | 6.7 |
| 1510 | 6.881 | 65.0 | 51.4 | 6.881 | 45.8 | 27.4 | 3.3 |
| 1539 | ****** | ****** | ****** | ****** | ****** | ****** | 8.3 |
| 1564 | 2.699 | 50.9 | 21.2 | ****** | 0.0 | 6.2 | 23.3 |
| 1597 | 4.015 | 55.1 | 28.3 | 0.746 | 41.8 | 0.0 | 26.7 |
| Mean | 4.734 | 55.1 | 32.7 | 5.114 | 43.5 | 20.3 | 14.7 |
| S.D. | 1.792 | 7.1 | 13.0 | 3.728 | 29.1 | 16.7 | 9.8 |

150 dB 100X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1365 | ****** | 37.2 | 55.4 | 2.487 | 104.4 | 22.0 | 16.7 |
| 1448 | 2.809 | 128.9 | 55.3 | 4.100 | 102.7 | 55.4 | -5.0 |
| 1510 | 4.606 | 85.0 | 55.5 | 4.100 | 70.5 | 44.4 | 6.7 |
| 1539 | ****** | ****** | ****** | ****** | ****** | ****** | 11.7 |
| 1564 | 3.255 | 42.2 | 33.2 | 3.255 | 90.2 | 33.2 | 1.7 |
| 1597 | 3.706 | 87.8 | 66.4 | ****** | ****** | ****** | 3.3 |
| Mean | 3.594 | 76.2 | 53.2 | 3.486 | 91.9 | 38.8 | 5.8 |
| S.D. | 0.768 | 37.6 | 12.1 | 0.776 | 15.6 | 14.4 | 7.7 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1365 | ****** | ****** | 42.5 | 3.095 | 72.0 | 21.8 | 10.0 |
| 1448 | ****** | ****** | 73.5 | 4.252 | 57.9 | 44.2 | -5.0 |
| 1510 | 1.771 | 22.6 | 33.0 | 3.258 | 69.9 | 43.1 | 1.7 |
| 1539 | ****** | ****** | ****** | ****** | ****** | ****** | 8.3 |
| 1564 | 3.570 | 82.7 | 44.2 | 4.305 | 65.8 | 10.1 | 5.0 |
| 1597 | 2.652 | 60.0 | 33.6 | ****** | ****** | ****** | -8.3 |
| Mean | 2.664 | 55.1 | 45.4 | 3.727 | 66.4 | 29.8 | 1.9 |
| S.D. | 0.899 | 30.4 | 16.5 | 0.640 | 6.2 | 16.7 | 7.3 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1365 | ****** | 34.7 | 11.4 | 2.891 | 103.4 | 65.7 | 1.7 |
| 1448 | 4.728 | 127.3 | 85.3 | ****** | ****** | ****** | 5.0 |
| 1510 | 3.130 | 53.7 | 52.8 | 7.475 | 92.0 | 70.2 | 1.7 |
| 1539 | ****** | ****** | ****** | ****** | ****** | ****** | 11.7 |
| 1564 | 2.083 | 32.8 | 50.6 | 2.980 | 79.7 | 45.3 | 5.0 |
| 1597 | 4.633 | 79.7 | 110.2 | ****** | ****** | ****** | 10.0 |
| Mean | 3.644 | 65.6 | 62.1 | 4.449 | 91.7 | 60.4 | 5.8 |
| S.D. | 1.272 | 39.3 | 37.6 | 2.621 | 11.9 | 13.3 | 4.2 |

150 dB 100X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0553 | 2.080 | 39.1 | 31.6 | 1.411 | 15.7 | 19.0 | -1.7 |
| 0556 | 1.089 | 25.3 | 12.4 | 0.968 | 26.7 | 12.6 | -1.7 |
| 0557 | 1.288 | 25.4 | 19.0 | 1.659 | 35.0 | 31.4 | -3.3 |
| 0558 | 1.870 | 29.8 | 19.0 | 1.486 | 31.0 | 18.8 | 1.7 |
| 0559 | 3.613 | 36.8 | 44.0 | 1.033 | 38.1 | 12.6 | 3.3 |
| Mean | 1.988 | 31.3 | 25.2 | 1.311 | 29.3 | 18.9 | -0.3 |
| S.D. | 0.995 | 6.4 | 12.6 | 0.299 | 8.7 | 7.7 | 2.7 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0553 | 1.779 | 47.0 | 32.5 | 2.738 | 50.6 | 36.9 | 0.0 |
| 0556 | 2.557 | 59.0 | 43.6 | 2.931 | 53.1 | 25.2 | 1.7 |
| 0557 | 2.738 | 66.1 | 31.3 | 3.570 | 70.5 | 42.5 | -6.7 |
| 0558 | 2.100 | 50.7 | 26.9 | 2.557 | 38.3 | 32.5 | 0.0 |
| 0559 | 2.557 | 51.1 | 32.5 | 2.851 | 44.4 | 32.5 | -1.7 |
| Mean | 2.346 | 54.8 | 33.3 | 2.929 | 51.4 | 33.9 | -1.3 |
| S.D. | 0.395 | 7.7 | 6.2 | 0.384 | 12.1 | 6.4 | 3.2 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0553 | 3.579 | 56.0 | 28.3 | 4.325 | 52.2 | 52.3 | 0.0 |
| 0556 | 4.100 | 33.7 | 14.2 | 1.615 | 30.0 | 15.1 | 3.3 |
| 0557 | 4.041 | 65.5 | 29.2 | 3.324 | 65.5 | 22.1 | -3.3 |
| 0558 | 1.722 | 69.0 | 15.1 | 3.199 | 78.6 | 30.1 | 0.0 |
| 0559 | 5.249 | 49.1 | 29.2 | 1.190 | 51.7 | 0.0 | 8.3 |
| Mean | 3.738 | 54.7 | 23.2 | 2.731 | 55.6 | 23.9 | 1.7 |
| S.D. | 1.284 | 14.1 | 7.9 | 1.297 | 18.1 | 19.3 | 4.4 |

150 dB 100X 1/10M

## INDIVIDUAL TUNING CURVE STATISTICS

### Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0553 | 3.084 | 110.5 | 55.2 | 2.728 | 108.4 | 44.1 | 1.7 |
| 0556 | 5.760 | 70.4 | 55.6 | 4.232 | 73.3 | 66.4 | -1.7 |
| 0557 | 3.532 | 123.6 | 66.5 | 3.236 | 72.4 | 66.4 | 0.0 |
| 0558 | 3.038 | 69.9 | 66.4 | 3.255 | 96.7 | 44.2 | 5.0 |
| 0559 | 3.129 | 87.2 | 77.6 | 4.412 | 109.6 | 99.5 | 5.0 |
| Mean | 3.708 | 92.3 | 64.3 | 3.573 | 92.1 | 64.1 | 2.0 |
| S.D. | 1.163 | 24.1 | 9.3 | 0.719 | 18.2 | 22.7 | 3.0 |

### Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0553 | 3.094 | 80.4 | 21.3 | 2.058 | 69.9 | 21.8 | -1.7 |
| 0556 | 1.484 | 63.6 | 1.1 | 1.357 | 52.2 | 10.6 | 5.0 |
| 0557 | 8.900 | 109.8 | 52.0 | 7.282 | 90.1 | 52.0 | -1.7 |
| 0558 | 5.286 | 107.4 | 31.9 | 4.305 | 67.8 | 43.7 | 0.0 |
| 0559 | 4.576 | 76.4 | 42.5 | 3.001 | 56.4 | 43.7 | 3.3 |
| Mean | 4.668 | 87.5 | 29.8 | 3.601 | 67.3 | 34.3 | 1.0 |
| S.D. | 2.780 | 20.3 | 19.7 | 2.336 | 14.8 | 17.3 | 3.0 |

### Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0553 | 2.563 | 70.1 | 45.3 | 2.714 | 71.1 | 40.0 | 0.0 |
| 0556 | 2.241 | 74.7 | 55.9 | 3.405 | 74.0 | 45.3 | 0.0 |
| 0557 | 3.771 | 91.3 | 40.0 | 3.527 | 106.4 | 75.5 | 0.0 |
| 0558 | 3.007 | 92.6 | 50.6 | 3 446 | 109.9 | 101.2 | 0.0 |
| 0559 | 5.116 | 80.3 | 65.7 | 3.188 | 88.6 | 65.7 | 8.3 |
| Mean | 3.339 | 81.8 | 51.5 | 3.256 | 90.0 | 65.5 | 1.7 |
| S.D. | 1.147 | 10.0 | 9.9 | 0.328 | 17.9 | 24.6 | 3.7 |

155 dB 1X

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1933 | 1.038 | 33.6 | 25.6 | 1.134 | 26.8 | 25.4 | -6.7 |
| 1961 | 1.120 | 27.9 | 25.0 | 0.757 | 26.8 | 12.6 | 6.7 |
| 1975 | 1.486 | 28.8 | 31.6 | 0.938 | 27.3 | 25.6 | 0.0 |
| 2016 | 1.769 | 25.8 | 24.8 | 1.349 | 33.3 | 25.0 | -3.3 |
| 2076 | 0.700 | 28.0 | 12.8 | 2.436 | 33.5 | 31.4 | -1.7 |
| Mean | 1.222 | 28.8 | 23.9 | 1.323 | 29.5 | 24.0 | -1.0 |
| S.D. | 0.414 | 2.9 | 6.8 | 0.660 | 3.5 | 6.9 | 4.9 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1933 | 1.768 | 46.9 | 21.8 | 2.851 | 44.0 | 21.3 | 0.0 |
| 1961 | 1.216 | 45.8 | 16.8 | 1.315 | 42.0 | 16.8 | 3.3 |
| 1975 | 1.837 | 48.6 | 27.4 | 1.315 | 47.4 | 16.8 | 3.3 |
| 2016 | 2.476 | 47.4 | 31.9 | 3.591 | 53.6 | 26.3 | 0.0 |
| 2076 | 2.557 | 46.1 | 21.3 | 1.551 | 32.4 | 16.8 | -10.0 |
| Mean | 1.971 | 47.0 | 23.8 | 2.125 | 43.9 | 19.6 | -0.7 |
| S.D. | 0.554 | 1.1 | 5.9 | 1.039 | 7.8 | 4.2 | 5.5 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1933 | 1.238 | 44.0 | 23.9 | 8.309 | 40.1 | 0.0 | 3.3 |
| 1961 | 4.568 | 36.3 | 38.1 | 1.418 | 43.8 | 31.0 | -1.7 |
| 1975 | 4.568 | 57.4 | 46.1 | ****** | ****** | ****** | -1.7 |
| 2016 | 2.772 | 50.4 | 14.2 | 4.568 | 32.4 | 38.1 | -3.3 |
| 2076 | 2.608 | 50.8 | 31.0 | 3.418 | 70.0 | 14.2 | -5.0 |
| Mean | 3.150 | 47.8 | 30.7 | 4.428 | 46.6 | 20.8 | -1.7 |
| S.D. | 1.424 | 8.0 | 12.4 | 2.896 | 16.3 | 17.1 | 3.1 |

155 dB 1X

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1933 | 4.100 | 72.8 | 33.3 | 4.100 | 91.9 | 44.4 | -3.3 |
| 1961 | 2.469 | 52.6 | 22.1 | 4.100 | 66.3 | 33.3 | 0.0 |
| 1975 | 6.768 | 112.6 | 66.6 | 3.489 | 114.1 | 44.3 | 1.7 |
| 2016 | 4.420 | 48.2 | 55.3 | 3.129 | 52.5 | 55.5 | 10.0 |
| 2076 | 2.469 | 41.9 | 22.2 | 1.636 | 46.7 | 33.1 | -1.7 |
| Mean | 4.045 | 65.6 | 39.9 | 3.291 | 74.3 | 42.1 | 1.3 |
| S.D. | 1.770 | 28.7 | 20.1 | 1.014 | 28.3 | 9.3 | 5.2 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1933 | 4.305 | 83.1 | 43.7 | 2.819 | 48.2 | 33.0 | 5.0 |
| 1961 | 3.941 | 71.5 | 33.0 | 1.704 | 51.9 | 33.6 | -8.3 |
| 1975 | 1.664 | 68.7 | 11.8 | 2.717 | 70.4 | 22.4 | 3.3 |
| 2016 | 5.286 | 76.1 | 43.1 | 7.799 | 94.6 | 75.5 | -5.0 |
| 2076 | 1.588 | 60.5 | 21.8 | 5.192 | 86.9 | 54.9 | -13.3 |
| Mean | 3.357 | 72.0 | 30.7 | 4.046 | 70.4 | 43.9 | -3.7 |
| S.D. | 1.655 | 8.4 | 13.8 | 2.457 | 20.6 | 21.3 | 7.8 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1933 | 0.960 | 86.5 | 0.0 | ****** | 2.8 | 78.6 | -1.7 |
| 1961 | 6.718 | 77.3 | 55.1 | 4.062 | 77.1 | 35.5 | -1.7 |
| 1975 | ****** | ****** | ****** | 0.871 | 71.6 | 0.0 | 6.7 |
| 2016 | 2.091 | 60.0 | 35.5 | ****** | ****** | ****** | -3.3 |
| 2076 | 5.238 | 62.5 | 0.0 | 11.496 | 105.2 | 95.1 | -11.7 |
| Mean | 3.751 | 71.6 | 22.6 | 5.477 | 64.2 | 52.3 | -2.3 |
| S.D. | 2.681 | 12.5 | 27.3 | 5.452 | 43.5 | 43.0 | 6.5 |

155 dB 10X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1534 | 0.885 | 23.2 | 18.8 | 0.947 | 24.7 | 25.2 | 0.0 |
| 1700 | 3.182 | 31.1 | 25.0 | 2.080 | 32.8 | 25.2 | -3.3 |
| 1716 | 0.724 | 24.1 | 12.5 | 1.769 | 25.2 | 31.2 | 10.0 |
| 1718 | ****** | 11.0 | 18.8 | 1.235 | 24.1 | 0.0 | 8.3 |
| 1759 | 1.659 | 28.3 | 31.4 | 1.030 | 24.0 | 0.0 | 11.7 |
| Mean | 1.612 | 23.5 | 21.3 | 1.412 | 26.1 | 16.3 | 5.3 |
| S.D. | 1.123 | 7.7 | 7.2 | 0.492 | 3.8 | 15.1 | 6.6 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1534 | 1.607 | 57.9 | 21.8 | 1.929 | 58.9 | 26.9 | -1.7 |
| 1700 | ****** | ****** | ****** | 1.205 | 46.2 | 11.2 | -5.0 |
| 1716 | 1.689 | 49.5 | 21.3 | 1.121 | 30.0 | 11.2 | 15.0 |
| 1718 | 1.768 | 38.2 | 21.8 | 1.589 | 37.0 | 10.6 | 16.7 |
| 1759 | 1.445 | 47.4 | 16.2 | 1.032 | 19.9 | 5.6 | 21.7 |
| Mean | 1.627 | 48.3 | 20.3 | 1.375 | 38.4 | 13.1 | 9.3 |
| S.D. | 0.138 | 8.1 | 2.7 | 0.375 | 15.0 | 8.0 | 11.9 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1534 | 3.199 | 73.5 | 22.1 | 4.100 | 77.6 | 22.1 | 3.3 |
| 1700 | 4.015 | 68.5 | 20.4 | 4.100 | 68.9 | 22.1 | -3.3 |
| 1716 | 2.039 | 64.2 | 22.1 | 2.121 | 64.7 | 37.2 | 5.0 |
| 1718 | 6.041 | 38.5 | 29.2 | 9.200 | 71.4 | 26.5 | 3.3 |
| 1759 | 5.247 | 55.2 | 50.5 | 8.309 | 43.8 | 19.5 | 10.8 |
| Mean | 4.108 | 60.0 | 28.9 | 5.566 | 65.3 | 25.5 | 3.8 |
| S.D. | 1.593 | 13.7 | 12.5 | 3.037 | 12.9 | 7.0 | 5.1 |

155 dB 10X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1534 | 3.951 | 66.7 | 44.3 | 3.226 | 114.6 | 44.3 | 0.0 |
| 1700 | 4.754 | 92.5 | 44.4 | 3.489 | 116.8 | 44.3 | 8.3 |
| 1716 | 2.733 | 103.4 | 22.2 | 3.654 | 98.1 | 33.2 | 11.7 |
| 1718 | 3.255 | 70.4 | 33.2 | 2.733 | 101.0 | 22.2 | 3.3 |
| 1759 | 2.733 | 72.6 | 22.2 | 3.654 | 100.5 | 33.2 | 7.1 |
| Mean | 3.485 | 81.1 | 33.3 | 3.351 | 106.2 | 35.4 | 6.1 |
| S.D. | 0.867 | 16.0 | 11.1 | 0.387 | 8.8 | 9.2 | 4.5 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1534 | 1.850 | 37.2 | 45.4 | 3.014 | 97.8 | 44.2 | 0.0 |
| 1700 | 2.914 | 44.0 | 22.4 | 1.343 | 28.2 | 10.6 | 5.0 |
| 1716 | ****** | 12.5 | 11.2 | 1.356 | 59.0 | 0.0 | 13.3 |
| 1718 | 1.870 | 50.2 | 11.8 | 1.281 | 63.0 | 1.1 | 6.7 |
| 1759 | 5.993 | 56.1 | 31.3 | 2.652 | 67.6 | 33.6 | 0.8 |
| Mean | 3.157 | 40.0 | 24.4 | 1.929 | 63.1 | 17.9 | 5.2 |
| S.D. | 1.955 | 16.9 | 14.4 | 0.835 | 24.8 | 20.0 | 5.3 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1534 | 8.681 | 102.5 | 49.8 | 2.431 | 125.1 | 24.9 | 3.3 |
| 1700 | 5.750 | 78.8 | 80.0 | 3.684 | 112.2 | 55.9 | 0.0 |
| 1716 | ****** | 30.2 | 50.6 | 4.578 | 127.7 | 100.4 | 6.7 |
| 1718 | 3.405 | 88.0 | 45.3 | 2.025 | 82.1 | 40.8 | 6.7 |
| 1759 | 4.633 | 80.7 | 155.9 | 4.638 | 70.1 | 77.7 | 8.3 |
| Mean | 5.617 | 76.0 | 76.3 | 3.471 | 103.4 | 59.9 | 5.0 |
| S.D. | 2.256 | 27.3 | 46.5 | 1.205 | 26.0 | 29.9 | 3.3 |

155 dB 10X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1102 | 1.135 | 19.7 | 11.4 | 2.753 | 25.9 | 30.2 | 8.3 |
| 1271 | 1.340 | 18.9 | 3.9 | 1.229 | 32.0 | 16.5 | 5.0 |
| 1272 | 1.239 | 36.6 | 0.0 | 1.750 | 25.2 | 9.9 | 10.0 |
| 1280 | 2.058 | 49.5 | 22.7 | 1.120 | 30.5 | 18.6 | -0.5 |
| 1293 | 2.051 | 25.8 | 19.0 | 1.284 | 24.5 | 6.2 | 24.7 |
| Mean | 1.565 | 30.1 | 11.4 | 1.627 | 27.6 | 16.3 | 9.5 |
| S.D. | 0.453 | 13.0 | 9.6 | 0.674 | 3.4 | 9.2 | 9.4 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1102 | 1.959 | 43.1 | 25.3 | 2.011 | 38.8 | 20.8 | 8.3 |
| 1271 | 0.900 | 26.3 | 2.1 | 1.643 | 41.0 | 18.4 | 0.0 |
| 1272 | 0.657 | 14.4 | 7.2 | 1.520 | 26.4 | 12.8 | 28.3 |
| 1280 | ****** | 22.7 | 7.2 | 2.557 | 55.1 | 26.9 | 0.8 |
| 1293 | 1.649 | 41.1 | 16.2 | 2.557 | 0.0 | 15.7 | 26.7 |
| Mean | 1.291 | 29.5 | 11.6 | 2.058 | 32.2 | 18.9 | 12.8 |
| S.D. | 0.613 | 12.3 | 9.2 | 0.490 | 20.7 | 5.4 | 13.8 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1102 | 3.450 | 29.7 | 27.6 | 4.885 | 26.2 | 26.7 | 15.0 |
| 1271 | 2.886 | 38.0 | 31.7 | 6.246 | 57.0 | 27.3 | -1.7 |
| 1272 | 1.298 | 176.7 | 6.9 | 2.564 | 31.7 | 23.8 | 21.7 |
| 1280 | 5.421 | 57.6 | 44.1 | 6.153 | 45.2 | 28.3 | -6.5 |
| 1293 | 7.981 | 43.3 | 36.3 | 5.727 | 12.0 | 16.8 | 24.0 |
| Mean | 4.207 | 69.0 | 29.3 | 5.115 | 34.4 | 24.6 | 10.5 |
| S.D. | 2.574 | 61.0 | 13.9 | 1.524 | 17.4 | 4.7 | 13.8 |

155 dB 10X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1102 | 5.118 | 86.1 | 68.9 | 4.828 | 76.2 | 57.6 | 5.0 |
| 1271 | 1.291 | 27.1 | 0.0 | 2.133 | 64.0 | 11.0 | 17.9 |
| 1272 | 0.998 | 32.3 | 0.0 | 1.265 | 23.5 | 0.0 | 3.3 |
| 1280 | 2.612 | 99.0 | 33.1 | 3.532 | 80.7 | 55.4 | 5.2 |
| 1293 | 4.754 | 116.0 | 55.4 | 2.733 | 32.3 | 33.3 | 17.3 |
| Mean | 2.955 | 72.1 | 31.5 | 2.898 | 55.3 | 31.5 | 9.8 |
| S.D. | 1.912 | 40.2 | 31.4 | 1.361 | 26.0 | 25.8 | 7.2 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1102 | ****** | 86.7 | ****** | 5.668 | 70.0 | 27.7 | 11.7 |
| 1271 | 1.271 | 43.2 | 0.0 | 1.889 | 59.3 | 5.8 | 15.4 |
| 1272 | 2.184 | 50.9 | 17.6 | 3.921 | 52.4 | 39.4 | 3.3 |
| 1280 | 1.759 | 80.3 | 6.4 | 1.851 | 78.0 | 0.0 | -2.8 |
| 1293 | 2.938 | 86.9 | 21.3 | 3.522 | 53.8 | 10.1 | -3.0 |
| Mean | 2.038 | 69.6 | 11.3 | 3.370 | 62.7 | 16.6 | 4.9 |
| S.D. | 0.706 | 20.9 | 9.8 | 1.589 | 11.0 | 16.4 | 8.4 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1102 | 3.226 | 93.2 | 43.2 | 2.218 | 75.7 | 3.2 | 1.7 |
| 1271 | 10.504 | 95.9 | 35.5 | ****** | 11.6 | 0.0 | -1.7 |
| 1272 | 16.843 | 127.6 | 55.8 | 3.925 | 52.3 | 56.6 | 10.0 |
| 1280 | 9.012 | 100.5 | 60.4 | ****** | 68.1 | 5.7 | -5.0 |
| 1293 | ****** | 82.6 | ****** | 8.399 | 85.2 | 44.9 | 3.3 |
| Mean | 9.896 | 99.9 | 48.7 | 4.847 | 58.6 | 22.1 | 1.7 |
| S.D. | 5.595 | 16.8 | 11.4 | 3.192 | 28.9 | 26.6 | 5.7 |

155 dB 10X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1925 | 3.327 | 31.7 | 37.4 | 1.659 | 32.9 | 18.6 | -3.3 |
| 1931 | 1.189 | 24.6 | 25.2 | 1.659 | 28.9 | 31.4 | -5.0 |
| 1948 | 1.407 | 36.5 | 6.2 | 0.979 | 30.6 | 6.4 | 3.3 |
| 1967 | 1.659 | 20.0 | 18.6 | 3.182 | 37.6 | 25.0 | -12.0 |
| 1974 | 1.289 | 34.2 | 18.8 | 1.059 | 26.9 | 19.0 | 1.7 |
| Mean | 1.774 | 29.4 | 21.2 | 1.708 | 31.4 | 20.1 | -3.1 |
| S.D. | 0.886 | 6.9 | 11.4 | 0.884 | 4.1 | 9.3 | 6.1 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1925 | 1.266 | 62.5 | 5.6 | 1.125 | 59.3 | 5.0 | 6.7 |
| 1931 | 2.100 | 38.2 | 21.3 | 1.689 | 47.4 | 15.7 | 1.7 |
| 1948 | 2.557 | 47.8 | 4.5 | 2.557 | 62.8 | 21.3 | 5.0 |
| 1967 | ****** | 16.2 | 5.6 | 1.548 | 62.5 | 16.2 | -10.3 |
| 1974 | 1.094 | 56.1 | 5.0 | 1.230 | 50.6 | 11.2 | 6.7 |
| Mean | 1.754 | 44.2 | 8.4 | 1.630 | 56.5 | 13.9 | 1.9 |
| S.D. | 0.692 | 18.1 | 7.2 | 0.567 | 7.1 | 6.1 | 7.2 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1925 | 7.269 | 58.6 | 44.3 | 1.139 | 31.6 | 0.0 | 11.7 |
| 1931 | 3.610 | 54.8 | 13.3 | 6.153 | 49.9 | 4.4 | -1.7 |
| 1948 | 6.041 | 68.6 | 29.2 | 1.970 | 74.5 | 15.1 | -1.7 |
| 1967 | 8.309 | 77.4 | 43.4 | 7.269 | 78.6 | 20.4 | -3.7 |
| 1974 | ****** | ****** | 35.4 | 10.970 | 50.3 | 11.5 | 13.3 |
| Mean | 6.307 | 64.9 | 33.1 | 5.500 | 57.0 | 10.3 | 3.6 |
| S.D. | 2.023 | 10.2 | 12.7 | 4.030 | 19.4 | 8.2 | 8.2 |

155 dB 10X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1925 | 2.531 | 110.5 | 22.1 | 3.654 | 49.3 | 44.2 | -3.3 |
| 1931 | 4.406 | 78.3 | 44.5 | 2.972 | 80.8 | 33.2 | -1.7 |
| 1948 | 5.059 | 100.2 | 44.5 | 3.489 | 106.9 | 44.3 | -1.7 |
| 1967 | 1.896 | 81.7 | 10.9 | 3.255 | 98.5 | 33.2 | -3.7 |
| 1974 | 2.352 | 77.8 | 22.1 | 3.255 | 102.7 | 33.2 | 1.7 |
| Mean | 3.249 | 89.7 | 28.8 | 3.325 | 87.6 | 37.6 | -1.7 |
| S.D. | 1.393 | 14.8 | 15.0 | 0.260 | 23.6 | 6.0 | 2.1 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1925 | 4.305 | 80.2 | 32.5 | 1.607 | 64.7 | 0.0 | 3.3 |
| 1931 | 0.840 | 42.8 | 0.0 | ****** | ****** | ****** | -1.0 |
| 1948 | 2.717 | 55.7 | 23.0 | 1.147 | 31.3 | 11.2 | -1.7 |
| 1967 | 3.236 | 89.6 | 35.6 | 1.674 | 70.8 | 10.6 | 1.3 |
| 1974 | ****** | 25.1 | 0.0 | 3.522 | 70.3 | 10.1 | -1.2 |
| Mean | 2.774 | 58.7 | 18.2 | 1.987 | 59.3 | 8.0 | 0.1 |
| S.D. | 1.449 | 26.5 | 17.3 | 1.049 | 18.9 | 5.3 | 2.1 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | [illegible] Slope | PTS |
| 1925 | 3.567 | 71.4 | 17.4 | 0.862 | 56.2 | 0.[illegible] | -5.0 |
| 1931 | 3.748 | 106.9 | 47.6 | ****** | ****** | *[illegible] | -0.4 |
| 1948 | 2.852 | 85.9 | 40.0 | 1.486 | 70.6 | 9.8 | 0.0 |
| 1967 | ****** | 81.0 | 0.0 | 3.603 | 97.2 | 52.8 | 9.7 |
| 1974 | 3.144 | 86.4 | 30.2 | 2.730 | 98.9 | 9.8 | -1.7 |
| Mean | 3.328 | 86.3 | 27.0 | 2.170 | 80.7 | 18.1 | 0.5 |
| S.D. | 0.405 | 13.0 | 18.9 | 1.231 | 20.9 | 23.6 | 5.5 |

155 dB 100X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1880 | 1.129 | 31.2 | 31.6 | 0.867 | 5.9 | 0.0 | 33.3 |
| 1922 | 1.486 | 23.1 | 25.2 | 1.607 | 26.1 | 31.6 | -10.0 |
| 1927 | 1.089 | 33.3 | 25.2 | 0.382 | 13.4 | 19.2 | 16.7 |
| 1945 | 1.059 | 22.9 | 19.0 | 0.403 | 9.4 | 18.8 | 0.0 |
| 1949 | 1.987 | 35.0 | 37.8 | 1.253 | 10.1 | 12.6 | 36.7 |
| 1953 | 1.478 | 25.7 | 19.0 | 0.865 | 15.1 | 12.8 | 15.0 |
| Mean | 1.371 | 28.5 | 26.3 | 0.896 | 13.3 | 15.8 | 15.3 |
| S.D. | 0.358 | 5.3 | 7.3 | 0.478 | 7.0 | 10.4 | 18.2 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1880 | 1.008 | 42.4 | 2.3 | 6.233 | 23.9 | 35.8 | 48.3 |
| 1922 | 2.241 | 48.2 | 33.0 | 1.551 | 41.1 | 16.8 | 3.3 |
| 1927 | 1.406 | 50.6 | 17.4 | 2.557 | 41.4 | 15.7 | 3.3 |
| 1945 | 1.837 | 38.2 | 32.5 | 1.213 | 39.9 | 28.0 | 1.7 |
| 1949 | 2.100 | 58.1 | 32.5 | ****** | 0.0 | 0.0 | 43.3 |
| 1953 | 2.241 | 48.2 | 33.0 | 1.205 | 21.6 | 11.2 | 31.7 |
| Mean | 1.806 | 47.6 | 25.1 | 2.552 | 28.0 | 17.9 | 21.9 |
| S.D. | 0.503 | 6.9 | 12.8 | 2.131 | 16.3 | 12.6 | 21.7 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1880 | 1.787 | 43.6 | 23.9 | ****** | 0.0 | 0.0 | 41.7 |
| 1922 | 1.226 | 37.7 | 31.9 | 4.100 | 18.9 | 30.1 | 1.7 |
| 1927 | 0.870 | 43.8 | 0.0 | 5.249 | 51.2 | 29.2 | 3.3 |
| 1945 | 0.976 | 48.0 | 0.9 | 2.278 | 55.4 | 15.1 | 5.0 |
| 1949 | 2.173 | 51.3 | 54.9 | 2.278 | 5.6 | 16.0 | 40.0 |
| 1953 | 1.577 | 55.0 | 22.1 | ****** | 0.0 | 0.0 | 35.0 |
| Mean | 1.435 | 46.5 | 22.3 | 3.476 | 21.8 | 15.1 | 21.1 |
| S.D. | 0.502 | 6.2 | 20.6 | 1.461 | 25.4 | 13.3 | 19.6 |

155 dB 100X 10/M

## INDIVIDUAL TUNING CURVE STATISTICS

### Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1880 | 4.754 | 84.0 | 33.3 | ****** | 3.1 | 0.0 | 41.7 |
| 1922 | 5.059 | 70.4 | 77.6 | 6.768 | 50.5 | 66.6 | -8.0 |
| 1927 | 3.489 | 94.3 | 44.3 | ****** | ****** | 22.1 | -11.7 |
| 1945 | 3.255 | 102.6 | 44.2 | 2.966 | 78.7 | 33.0 | -1.7 |
| 1949 | 4.100 | 92.1 | 44.4 | 4.754 | 64.2 | 33.3 | 23.3 |
| 1953 | 3.489 | 102.6 | 44.3 | 5.622 | 124.4 | 99.6 | 5.0 |
| Mean | 4.024 | 91.0 | 48.0 | 5.028 | 64.2 | 42.4 | 8.1 |
| S.D. | 0.745 | 12.3 | 15.1 | 1.603 | 44.0 | 35.3 | 20.6 |

### Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1880 | 5.286 | 90.9 | 76.7 | ****** | ****** | 0.0 | 56.7 |
| 1922 | 5.192 | 101.9 | 66.1 | 3.500 | 67.1 | 33.6 | 8.3 |
| 1927 | 1.562 | 57.3 | 11.2 | 2.750 | 83.8 | 43.7 | -8.3 |
| 1945 | 1.074 | 53.5 | 0.0 | 1.607 | 52.0 | 0.0 | 5.0 |
| 1949 | 4.305 | 59.1 | 32.5 | 1.494 | 51.4 | 22.4 | 13.3 |
| 1953 | 0.969 | 20.8 | 11.8 | 1.484 | 62.5 | 1.1 | 11.7 |
| Mean | 3.065 | 63.9 | 33.0 | 2.167 | 63.4 | 16.8 | 14.4 |
| S.D. | 2.079 | 29.0 | 31.7 | 0.915 | 13.3 | 19.2 | 22.1 |

### Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1880 | 2.664 | 73.6 | 61.2 | ****** | 0.0 | 0.0 | 66.7 |
| 1922 | 6.221 | 122.5 | 75.5 | 5.750 | 107.5 | 80.0 | 8.3 |
| 1927 | 5.750 | 74.0 | 19.6 | 1.743 | 59.9 | 0.0 | 3.3 |
| 1945 | 4.241 | 87.5 | 55.1 | 3.405 | 65.5 | 45.3 | -5.0 |
| 1949 | 1.602 | 57.5 | 0.0 | 1.150 | 37.2 | 15.1 | 6.7 |
| 1953 | 11.496 | 77.3 | 80.0 | 3.453 | 102.3 | 75.5 | 15.0 |
| Mean | 5.329 | 82.1 | 48.6 | 3.100 | 62.1 | 36.0 | 15.8 |
| S.D. | 3.498 | 22.0 | 32.0 | 1.795 | 40.4 | 36.4 | 25.8 |

155 dB 100X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1746 | 1.232 | 29.3 | 18.8 | 0.865 | 19.7 | 12.8 | 13.3 |
| 1826 | 1.486 | 29.3 | 31.6 | 0.536 | 17.7 | 19.2 | 23.3 |
| 1854 | 1.118 | 30.2 | 19.0 | 0.700 | 21.3 | 6.6 | -1.7 |
| 1866 | 0.938 | 29.4 | 19.0 | 0.885 | 21.3 | 25.2 | -1.7 |
| 1868 | 1.288 | 29.7 | 19.0 | 1.106 | 22.1 | 6.4 | 10.0 |
| 1887 | 0.980 | 31.2 | 19.2 | 1.345 | 25.5 | 25.4 | 8.3 |
| Mean | 1.174 | 29.9 | 21.1 | 0.906 | 21.2 | 15.9 | 8.6 |
| S.D. | 0.205 | 0.8 | 5.1 | 0.288 | 2.6 | 8.6 | 9.5 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1746 | 1.588 | 45.8 | 22.9 | 1.400 | 19.5 | 11.2 | 26.7 |
| 1826 | 2.081 | 49.1 | 21.8 | 1.167 | 0.0 | 7.3 | 23.3 |
| 1854 | 1.837 | 49.0 | 27.4 | ****** | ****** | ****** | 3.3 |
| 1866 | 1.649 | 37.4 | 22.4 | 2.081 | 44.9 | 21.8 | 1.7 |
| 1868 | 1.837 | 46.9 | 27.4 | 0.572 | 6.7 | 16.2 | 18.3 |
| 1887 | 2.081 | 50.7 | 21.8 | 1.400 | 15.8 | 11.2 | 26.7 |
| Mean | 1.846 | 46.5 | 24.0 | 1.324 | 17.4 | 13.5 | 16.7 |
| S.D. | 0.208 | 4.8 | 2.7 | 0.542 | 17.2 | 5.6 | 11.4 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1746 | 1.454 | 38.9 | 39.0 | ****** | 0.0 | 1.8 | 25.0 |
| 1826 | 1.577 | 41.1 | 0.0 | 0.604 | 8.2 | 0.0 | 20.0 |
| 1854 | 1.577 | 54.9 | 7.1 | ****** | ****** | ****** | 5.0 |
| 1866 | 2.874 | 49.3 | 23.0 | 2.278 | 58.4 | 15.1 | -5.0 |
| 1868 | 2.874 | 29.0 | 23.0 | 4.100 | 44.3 | 14.2 | 16.7 |
| 1887 | 1.262 | 24.6 | 14.2 | 2.278 | 18.4 | 15.1 | 16.7 |
| Mean | 1.936 | 39.6 | 17.7 | 2.315 | 25.8 | 9.2 | 13.1 |
| S.D. | 0.735 | 11.6 | 13.8 | 1.428 | 24.7 | 7.6 | 11.0 |

155 dB 100X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1746 | 2.728 | 56.8 | 33.1 | 2.886 | 84.8 | 33.2 | 20.0 |
| 1826 | 3.654 | 60.2 | 44.2 | 2.378 | 53.1 | 10.9 | 11.7 |
| 1854 | 3.654 | 107.3 | 33.2 | ****** | ****** | ****** | 8.3 |
| 1866 | 3.404 | 66.7 | 33.1 | 2.175 | 84.8 | 10.9 | -2.5 |
| 1868 | 4.100 | 141.5 | 55.4 | 4.754 | 107.1 | 55.4 | -4.2 |
| 1887 | 3.255 | 68.0 | 33.2 | 3.951 | 112.0 | 44.3 | 14.2 |
| Mean | 3.466 | 83.4 | 38.7 | 3.229 | 88.4 | 31.0 | 7.9 |
| S.D. | 0.461 | 33.8 | 9.3 | 1.095 | 23.4 | 19.9 | 9.5 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1746 | 4.305 | 49.5 | 54.9 | 1.064 | 32.1 | 12.3 | 10.0 |
| 1826 | 2.005 | 78.8 | 33.6 | 1.436 | 57.4 | 21.8 | 10.0 |
| 1854 | 3.596 | 59.0 | 33.0 | ****** | ****** | ****** | -5.0 |
| 1866 | 1.356 | 61.1 | 1.1 | 1.784 | 75.0 | 11.8 | -16.7 |
| 1868 | 9.630 | 84.3 | 64.3 | 7.520 | 73.0 | 54.3 | 6.7 |
| 1887 | 2.377 | 35.0 | 55.4 | 2.582 | 70.0 | 33.0 | 20.0 |
| Mean | 3.878 | 61.3 | 40.4 | 2.877 | 61.5 | 26.7 | 4.2 |
| S.D. | 3.016 | 18.3 | 23.0 | 2.655 | 17.8 | 17.7 | 13.0 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1746 | 2.300 | 77.8 | 15.1 | 1.774 | 53.7 | 0.0 | 8.3 |
| 1826 | 1.182 | 28.4 | 0.0 | 3.833 | 73.8 | 30.2 | 15.0 |
| 1854 | 3.256 | 107.2 | 40.0 | ****** | ****** | ****** | 6.7 |
| 1866 | 4.384 | 83.2 | 4.5 | 1.328 | 98.6 | 9.8 | -6.7 |
| 1868 | 11.496 | 109.2 | 34.7 | 1.643 | 26.9 | 35.5 | -8.3 |
| 1887 | 6.718 | 110.3 | 90.6 | 5.609 | 129.6 | 40.0 | 5.0 |
| Mean | 4.889 | 86.0 | 30.8 | 2.838 | 76.5 | 23.1 | 3.3 |
| S.D. | 3.751 | 31.5 | 33.3 | 1.838 | 39.6 | 17.3 | 9.1 |

155 dB 100X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1914 | 1.486 | 26.3 | 31.6 | 1.486 | 13.4 | 12.6 | 16.7 |
| 1917 | 0.980 | 30.6 | 19.2 | 1.138 | 33.2 | 19.0 | 6.7 |
| 1970 | 1.129 | 28.8 | 18.8 | 1.011 | 21.0 | 19.0 | 6.7 |
| 1999 | 1.265 | 31.1 | 31.4 | 0.694 | 18.0 | 6.4 | 25.0 |
| 2066 | 0.578 | 24.3 | 25.2 | 1.038 | 28.3 | 31.6 | -3.3 |
| Mean | 1.088 | 28.2 | 25.2 | 1.073 | 22.8 | 17.7 | 10.3 |
| S.D. | 0.340 | 2.9 | 6.2 | 0.284 | 8.0 | 9.4 | 10.8 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1914 | 1.275 | 41.2 | 22.4 | 3.056 | 20.2 | 15.7 | 28.3 |
| 1917 | 1.589 | 37.3 | 11.2 | 1.589 | 48.4 | 11.8 | 0.0 |
| 1970 | 2.464 | 41.9 | 33.0 | 1.551 | 48.2 | 16.8 | 10.0 |
| 1999 | 2.217 | 52.4 | 36.9 | 1.013 | 24.6 | 16.2 | 21.7 |
| 2066 | 3.136 | 46.9 | 26.3 | 1.877 | 56.9 | 26.9 | -3.3 |
| Mean | 2.136 | 43.9 | 26.0 | 1.817 | 39.7 | 17.5 | 11.3 |
| S.D. | 0.734 | 5.8 | 10.0 | 0.759 | 16.2 | 5.6 | 13.6 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1914 | 2.278 | 44.6 | 15.1 | 4.100 | 0.0 | 6.2 | 25.0 |
| 1917 | 0.823 | 30.2 | 0.9 | 4.100 | 60.7 | 14.2 | -3.3 |
| 1970 | 1.418 | 36.8 | 31.0 | 6.153 | 52.8 | 28.3 | 8.3 |
| 1999 | 5.249 | 55.2 | 37.2 | 0.904 | 19.1 | 0.0 | 38.3 |
| 2066 | 4.568 | 37.7 | 30.1 | 0.976 | 56.0 | 0.0 | -3.3 |
| Mean | 2.867 | 40.9 | 22.9 | 3.247 | 37.7 | 9.7 | 13.0 |
| S.D. | 1.949 | 9.5 | 14.7 | 2.266 | 26.7 | 11.9 | 18.3 |

155 dB 100X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1914 | 3.165 | 71.2 | 22.1 | ****** | 0.0 | 0.0 | 21.7 |
| 1917 | 4.221 | 132.7 | 44.5 | 3.951 | 88.1 | 44.3 | 0.8 |
| 1970 | 4.754 | 108.0 | 44.4 | 2.728 | 63.4 | 33.1 | -5.8 |
| 1999 | 5.059 | 49.0 | 55.5 | ****** | 6.6 | 11.1 | 75.8 |
| 2066 | 3.706 | 119.8 | 66.4 | 2.728 | 116.9 | 44.2 | -1.7 |
| Mean | 4.181 | 96.2 | 46.6 | 3.136 | 55.0 | 26.5 | 18.2 |
| S.D. | 0.768 | 34.9 | 16.4 | 0.706 | 50.9 | 20.1 | 33.9 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1914 | 3.570 | 37.3 | 44.2 | 2.717 | 82.8 | 22.4 | 5.0 |
| 1917 | 1.484 | 104.7 | 10.6 | 1.799 | 53.9 | 23.5 | 0.0 |
| 1970 | 2.382 | 58.9 | 23.0 | 0.794 | 49.5 | 0.0 | 10.0 |
| 1999 | 7.821 | 105.1 | 65.5 | ****** | 9.1 | 0.0 | 70.0 |
| 2066 | 6.089 | 79.6 | 43.1 | 2.346 | 75.5 | 33.6 | 1.7 |
| Mean | 4.269 | 77.1 | 37.3 | 1.914 | 54.2 | 15.9 | 17.3 |
| S.D. | 2.633 | 29.4 | 21.2 | 0.836 | 28.8 | 15.2 | 29.7 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1914 | 1.463 | 48.5 | 0.0 | 0.881 | 59.8 | 15.1 | 18.3 |
| 1917 | 5.981 | 102.1 | 85.3 | 1.385 | 91.3 | 0.0 | 8.3 |
| 1970 | 1.095 | 26.5 | 0.0 | 0.937 | 57.1 | 9.8 | 11.7 |
| 1999 | 4.527 | 115.1 | 40.0 | ****** | 8.7 | 0.0 | 71.7 |
| 2066 | 13.836 | 118.2 | 110.2 | 6.581 | 100.2 | 80.8 | -3.3 |
| Mean | 5.380 | 82.1 | 47.1 | 2.446 | 63.4 | 21.1 | 21.3 |
| S.D. | 5.155 | 41.9 | 49.8 | 2.766 | 36.0 | 34.0 | 29.2 |

160 dB 1X

## INDIVIDUAL TUNING CURVE STATISTICS

### Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1843 | 1.189 | 24.6 | 31.6 | 1.038 | 31.0 | 6.0 | -11.7 |
| 1972 | 1.120 | 24.9 | 37.8 | 0.768 | 23.4 | 24.8 | -2.5 |
| 1973 | 1.038 | 27.1 | 12.4 | 1.486 | 29.7 | 31.6 | -4.6 |
| 2013 | 0.865 | 24.6 | 12.6 | 0.819 | 25.8 | 12.6 | -1.7 |
| 2035 | 0.973 | 24.9 | 18.8 | 0.808 | 27.9 | 12.4 | 3.3 |
| 2057 | 0.885 | 19.8 | 25.2 | 1.011 | 21.0 | 19.0 | -1.7 |
| Mean | 1.012 | 24.3 | 23.1 | 0.988 | 26.5 | 17.7 | -3.1 |
| S.D. | 0.129 | 2.4 | 10.3 | 0.268 | 3.8 | 9.3 | 4.9 |

### Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1843 | 1.717 | 26.1 | 28.0 | 1.284 | 61.6 | 17.4 | -10.0 |
| 1972 | 1.535 | 44.5 | 21.8 | 1.385 | 45.3 | 16.2 | 1.7 |
| 1973 | 1.837 | 40.0 | 21.3 | 2.100 | 54.5 | 21.3 | 0.0 |
| 2013 | 1.918 | 56.1 | 16.2 | 1.607 | 52.3 | 21.8 | [illegible] |
| 2035 | 1.578 | 57.8 | 21.8 | 1.918 | 41.5 | 16.2 | 3.3 |
| 2057 | 2.557 | 34.5 | 21.3 | 1.551 | 33.2 | 16.8 | -3.3 |
| Mean | 1.857 | 43.2 | 21.7 | 1.641 | 48.1 | 18.3 | -1.6 |
| S.D. | 0.373 | 12.3 | 3.7 | 0.313 | 10.2 | 2.6 | 4.7 |

### Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1843 | 3.858 | 74.2 | 21.2 | 1.324 | 61.4 | 15.1 | -3.3 |
| 1972 | 7.269 | 60.0 | 20.4 | 2.699 | 54.7 | 13.3 | 3.3 |
| 1973 | 5.249 | 49.9 | 21.2 | 5.249 | 30.4 | 5.3 | -3.7 |
| 2013 | 6.153 | 32.2 | 20.4 | 7.269 | 66.7 | 4.4 | 5.0 |
| 2035 | 5.249 | 48.6 | 21.2 | 4.568 | 33.8 | 6.2 | 0.0 |
| 2057 | 2.278 | 8.9 | 15.1 | 5.249 | 49.8 | 21.2 | -1.7 |
| Mean | 5.010 | 45.6 | 19.9 | 4.393 | 49.5 | 10.9 | -0.1 |
| S.D. | 1.750 | 22.7 | 2.4 | 2.101 | 14.7 | 6.7 | 3.6 |

160 dB 1X

# INDIVIDUAL TUNING CURVE STATISTICS

## Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1843 | 7.138 | 104.7 | 66.7 | 10.074 | 99.4 | 77.8 | 3.3 |
| 1972 | 3.951 | 98.9 | 44.3 | 2.890 | 104.6 | 44.3 | -1.7 |
| 1973 | 3.056 | 96.2 | 33.1 | 3.489 | 102.7 | 44.3 | 1.7 |
| 2013 | 2.585 | 66.8 | 11.1 | 3.009 | 79.3 | 22.2 | 6.7 |
| 2035 | 3.489 | 107.7 | 44.3 | 2.821 | 91.1 | 33.2 | 4.6 |
| 2057 | 2.733 | 87.8 | 22.2 | 2.123 | 67.9 | 11.0 | -5.0 |
| Mean | 3.825 | 93.7 | 36.9 | 4.068 | 90.8 | 38.8 | 1.6 |
| S.D. | 1.699 | 14.9 | 19.4 | 2.975 | 14.6 | 23.1 | 4.3 |

## Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1843 | 3.124 | 66.2 | 55.4 | 1.472 | 38.8 | 21.8 | -1.7 |
| 1972 | 3.001 | 63.7 | 43.7 | 2.376 | 69.4 | 33.0 | 13.3 |
| 1973 | 1.356 | 44.4 | 0.0 | 2.177 | 60.3 | 11.2 | 9.2 |
| 2013 | 1.064 | 34.2 | 0.0 | 2.058 | 81.0 | 21.8 | 5.0 |
| 2035 | ****** | 25.1 | 31.9 | 2.914 | 70.4 | 21.8 | 6.7 |
| 2057 | 1.425 | 46.6 | 10.6 | 3.322 | 65.9 | 0.0 | -8.3 |
| Mean | 1.994 | 46.7 | 23.6 | 2.387 | 64.3 | 18.3 | 4.0 |
| S.D. | 0.986 | 16.1 | 23.5 | 0.655 | 14.2 | 11.3 | 7.8 |

## Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1843 | 4.241 | 104.8 | 55.1 | 3.771 | 104.8 | 80.8 | 0.0 |
| 1972 | 2.848 | 74.7 | 70.2 | 0.940 | 52.1 | 1.2 | 12.5 |
| 1973 | 3.857 | 44.2 | 49.8 | 1.533 | 101.2 | 0.0 | 8.7 |
| 2013 | 13.756 | 100.6 | 44.5 | 4.389 | 104.9 | 45.3 | 0.0 |
| 2035 | 4.011 | 94.0 | 45.3 | 11.497 | 109.8 | 64.9 | 3.3 |
| 2057 | 4.019 | 89.2 | 50.6 | 4.011 | 85.6 | 71.0 | -5.0 |
| Mean | 5.455 | 84.6 | 52.6 | 4.357 | 93.1 | 43.9 | 3.3 |
| S.D. | 4.096 | 22.4 | 9.4 | 3.771 | 21.7 | 35.5 | 6.4 |

160 dB 10X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0515 | 0.885 | 23.2 | 18.8 | 0.801 | 28.1 | 12.8 | -1.7 |
| 0517 | 2.080 | 42.4 | 25.2 | 1.306 | 25.7 | 12.6 | -5.0 |
| 0518 | 1.288 | 24.9 | 19.0 | 1.465 | 25.0 | 6.4 | 5.0 |
| 0522 | 2.436 | 29.1 | 25.0 | 1.465 | 47.1 | 6.4 | 13.3 |
| 0523 | 1.486 | 26.9 | 25.2 | 1.249 | 42.0 | 6.4 | 16.7 |
| Mean | 1.635 | 29.3 | 22.6 | 1.257 | 33.6 | 8.9 | 5.7 |
| S.D. | 0.621 | 7.7 | 3.4 | 0.272 | 10.3 | 3.4 | 9.3 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0515 | 2.476 | 46.2 | 26.3 | 1.906 | 67.1 | 26.9 | 1.7 |
| 0517 | 3.570 | 55.7 | 36.9 | 3.136 | 70.5 | 37.5 | 5.0 |
| 0518 | 2.081 | 45.3 | 21.8 | 1.546 | 39.5 | 33.0 | 1.7 |
| 0522 | 1.649 | 36.1 | 16.2 | 0.853 | 12.2 | 5.0 | 35.0 |
| 0523 | 3.570 | 39.4 | 31.3 | ****** | 16.2 | 15.7 | 36.7 |
| Mean | 2.669 | 44.5 | 26.5 | 1.860 | 41.1 | 23.6 | 16.0 |
| S.D. | 0.873 | 7.5 | 8.1 | 0.956 | 27.4 | 13.2 | 18.2 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0515 | 1.414 | 37.2 | 0.0 | ****** | ****** | ****** | 1.7 |
| 0517 | 1.135 | 51.2 | 7.1 | 2.039 | 48.7 | 22.1 | 5.0 |
| 0518 | 4.015 | 41.8 | 20.4 | 4.100 | 51.6 | 70.0 | 1.7 |
| 0522 | 2.021 | 56.3 | 31.0 | ****** | 19.3 | 0.0 | 23.3 |
| 0523 | 1.332 | 53.1 | 7.1 | ****** | 0.0 | 0.0 | 35.0 |
| Mean | 1.983 | 47.9 | 13.1 | 3.070 | 29.9 | 23.0 | 13.3 |
| S.D. | 1.183 | 8.1 | 12.4 | 1.457 | 24.7 | 33.0 | 15.1 |

160 dB 10X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0515 | 2.733 | 62.4 | 33.3 | 4.100 | 94.3 | 55.4 | 11.7 |
| 0517 | 4.100 | 81.1 | 66.5 | 6.768 | 106.0 | 110.7 | 1.7 |
| 0518 | 5.059 | 90.2 | 55.5 | 2.422 | 56.2 | 55.4 | 8.3 |
| 0522 | 2.890 | 67.4 | 44.3 | 2.583 | 79.4 | 33.2 | 18.3 |
| 0523 | 3.532 | 67.5 | 55.4 | 2.819 | 63.2 | 33.4 | 23.3 |
| Mean | 3.663 | 73.7 | 51.0 | 3.739 | 79.8 | 57.7 | 12.7 |
| S.D. | 0.951 | 11.5 | 12.6 | 1.818 | 20.8 | 31.7 | 8.5 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0515 | 3.159 | 80.9 | 10.1 | 2.857 | 70.6 | 32.5 | 6.7 |
| 0517 | 2.382 | 72.9 | 21.8 | 4.152 | 93.4 | 31.9 | 5.0 |
| 0518 | 2.929 | 73.3 | 31.9 | 2.465 | 73.7 | 32.5 | 5.0 |
| 0522 | 0.868 | 80.6 | 0.0 | 2.857 | 89.7 | 21.3 | 3.3 |
| 0523 | 5.993 | 75.9 | 31.3 | 3.522 | 71.0 | 0.0 | 25.0 |
| Mean | 3.066 | 76.7 | 19.0 | 3.171 | 79.7 | 23.6 | 9.0 |
| S.D. | 1.864 | 3.8 | 13.8 | 0.667 | 11.0 | 14.0 | 9.0 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0515 | 3.835 | 83.9 | 55.1 | ****** | ****** | ****** | 3.3 |
| 0517 | 3.083 | 98.0 | 65.7 | 3.413 | 132.6 | 80.8 | 3.3 |
| 0518 | 13.755 | 102.2 | 74.7 | 4.527 | 81.6 | 80.8 | -1.7 |
| 0522 | 15.385 | 94.5 | 95.1 | 4.843 | 114.6 | 60.4 | 1.7 |
| 0523 | 2.356 | 100.1 | 24.9 | ****** | 0.0 | 0.0 | 31.7 |
| Mean | 7.683 | 95.7 | 63.1 | 4.261 | 82.2 | 55.5 | 7.7 |
| S.D. | 6.335 | 7.2 | 25.9 | 0.751 | 58.7 | 38.2 | 13.6 |

160 dB 10X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1714 | 1.264 | 33.6 | 25.2 | 0.808 | 22.3 | 25.2 | 1.7 |
| 1764 | 0.890 | 31.8 | 12.6 | 1.478 | 29.5 | 19.0 | 15.0 |
| 1776 | 1.072 | 33.8 | 31.4 | 0.602 | 22.2 | 18.6 | 5.0 |
| 1778 | 0.660 | 20.1 | 0.0 | 0.885 | 24.4 | 18.8 | 8.3 |
| 1779 | 0.910 | 31.0 | 25.4 | 0.746 | 25.0 | 19.0 | 5.0 |
| 1785 | 1.120 | 15.8 | 25.0 | 0.829 | 30.2 | 12.4 | 11.7 |
| Mean | 0.986 | 27.7 | 19.9 | 0.892 | 25.6 | 18.8 | 7.8 |
| S.D. | 0.212 | 7.8 | 11.5 | 0.303 | 3.5 | 4.0 | 4.9 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1714 | 2.557 | 57.4 | 32.5 | 1.482 | 57.8 | 16.2 | -3.3 |
| 1764 | 1.717 | 40.7 | 28.0 | 1.121 | 19.9 | 11.2 | 30.0 |
| 1776 | 1.418 | 48.7 | 16.2 | 1.529 | 53.3 | 21.3 | 6.7 |
| 1778 | 1.649 | 46.1 | 16.2 | 1.336 | 36.6 | 17.4 | 1.7 |
| 1779 | 1.433 | 52.0 | 28.0 | 1.837 | 43.2 | 27.4 | 3.3 |
| 1785 | 1.918 | 46.1 | 16.2 | 1.275 | 36.6 | 22.4 | 5.0 |
| Mean | 1.782 | 48.5 | 22.8 | 1.430 | 41.2 | 19.3 | 7.2 |
| S.D. | 0.423 | 5.7 | 7.4 | 0.248 | 13.6 | 5.6 | 11.7 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1714 | 2.077 | 61.4 | 15.1 | 3.026 | 49.5 | 14.2 | -1.7 |
| 1764 | 1.487 | 42.5 | 7.1 | ****** | 0.0 | 0.0 | 27.5 |
| 1776 | 6.881 | 52.7 | 67.3 | 2.593 | 64.4 | 14.2 | 3.3 |
| 1778 | 5.249 | 54.9 | 13.3 | 1.577 | 50.4 | 6.2 | 3.3 |
| 1779 | 1.228 | 51.3 | 8.0 | 5.016 | 69.4 | 38.1 | 0.0 |
| 1785 | 7.269 | 39.4 | 52.3 | 2.359 | 38.7 | 14.2 | 0.0 |
| Mean | 4.032 | 50.4 | 27.2 | 2.914 | 45.4 | 14.5 | 5.4 |
| S.D. | 2.766 | 8.1 | 25.9 | 1.287 | 24.8 | 12.9 | 11.0 |

160 dB 10X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1714 | 3.621 | 98.4 | 55.3 | 8.083 | 116.7 | 88.8 | 5.0 |
| 1764 | 3.489 | 91.9 | 44.3 | 3.951 | 77.4 | 44.3 | 6.7 |
| 1776 | 4.100 | 123.4 | 44.4 | 5.059 | 105.0 | 44.5 | 5.0 |
| 1778 | 2.733 | 91.8 | 22.1 | 3.404 | 98.9 | 33.1 | 1.7 |
| 1779 | 4.754 | 94.8 | 44.4 | 2.980 | 79.1 | 55.3 | 1.7 |
| 1785 | 3.056 | 106.8 | 33.1 | 5.155 | 100.2 | 43.8 | 0.0 |
| Mean | 3.625 | 101.2 | 40.6 | 4.772 | 96.2 | 51.6 | 3.3 |
| S.D. | 0.726 | 12.2 | 11.5 | 1.841 | 15.3 | 19.5 | 2.6 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1714 | 1.484 | 66.7 | 0.6 | 2.652 | 74.0 | 33.6 | 8.3 |
| 1764 | 3.522 | 68.7 | 32.5 | 3.073 | 86.3 | 33.6 | 6.2 |
| 1776 | 4.152 | 68.5 | 31.9 | 2.002 | 80.1 | 23.0 | 3.3 |
| 1778 | 1.189 | 34.8 | 0.0 | 1.499 | 70.2 | 10.6 | 6.7 |
| 1779 | 2.382 | 82.0 | 21.8 | 2.582 | 59.8 | 33.0 | -5.0 |
| 1785 | 3.522 | 87.1 | 32.5 | 3.045 | 70.8 | 21.8 | 0.0 |
| Mean | 2.708 | 68.0 | 19.9 | 2.476 | 73.5 | 25.9 | 3.3 |
| S.D. | 1.210 | 18.3 | 15.7 | 0.617 | 9.1 | 9.3 | 5.0 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1714 | 4.247 | 90.5 | 60.4 | 3.446 | 96.4 | 40.0 | 5.0 |
| 1764 | 6.265 | 99.4 | 59.6 | 4.527 | 72.9 | 40.0 | 3.3 |
| 1776 | 5.750 | 87.3 | 80.0 | 3.541 | 125.9 | 65.7 | 1.7 |
| 1778 | 2.300 | 89.8 | 9.8 | 3.295 | 90.3 | 30.2 | 10.0 |
| 1779 | 4.527 | 98.4 | 40.0 | 2.638 | 88.6 | 30.2 | -5.0 |
| 1785 | 2.875 | 60.4 | 30.2 | 4.241 | 123.3 | 55.1 | 8.3 |
| Mean | 4.327 | 87.6 | 46.7 | 3.615 | 99.6 | 43.5 | 3.9 |
| S.D. | 1.552 | 14.2 | 25.1 | 0.681 | 20.9 | 14.2 | 5.3 |

160 dB 10X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0445 | 1.744 | 26.9 | 25.2 | 2.600 | 20.4 | 25.2 | 3.3 |
| 0492 | 1.553 | 20.0 | 25.4 | 1.117 | 43.4 | 25.4 | -5.0 |
| 0503 | 1.713 | 23.2 | 19.0 | 1.086 | 17.5 | 6.4 | -3.3 |
| 0506 | 1.232 | 29.2 | 25.2 | 1.010 | 27.1 | 0.0 | 8.3 |
| 0508 | 2.051 | 25.6 | 19.0 | 1.093 | 28.7 | 19.0 | -3.3 |
| Mean | 1.658 | 25.0 | 22.7 | 1.381 | 27.4 | 15.2 | 0.0 |
| S.D. | 0.299 | 3.5 | 3.4 | 0.683 | 10.1 | 11.5 | 5.7 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0445 | 1.719 | 34.9 | 20.7 | 1.274 | 34.1 | 20.7 | 11.7 |
| 0492 | 1.529 | 31.2 | 21.3 | 4.170 | 75.7 | 31.3 | -1.7 |
| 0503 | 1.167 | 41.6 | 21.3 | 1.649 | 27.0 | 22.4 | -1.7 |
| 0506 | 1.924 | 47.4 | 31.9 | 2.557 | 28.1 | 15.7 | 25.0 |
| 0508 | 2.100 | 58.3 | 38.0 | 3.905 | 40.9 | 36.4 | 0.0 |
| Mean | 1.688 | 42.7 | 26.6 | 2.711 | 41.2 | 25.3 | 6.7 |
| S.D. | 0.362 | 10.7 | 7.9 | 1.301 | 20.1 | 8.4 | 11.7 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0445 | 4.100 | 34.6 | 38.1 | 3.610 | 49.5 | 13.3 | 10.0 |
| 0492 | 4.015 | 45.2 | 20.4 | 3.324 | 64.7 | 6.2 | 11.7 |
| 0503 | 2.772 | 61.6 | 22.1 | 3.610 | 50.3 | 29.2 | 6.7 |
| 0506 | 2.288 | 53.9 | 21.2 | ****** | 0.0 | 6.2 | 30.0 |
| 0508 | 1.093 | 49.7 | 0.0 | 1.799 | 54.6 | 15.1 | 0.0 |
| Mean | 2.854 | 49.0 | 20.4 | 3.086 | 43.8 | 14.0 | 11.7 |
| S.D. | 1.258 | 10.1 | 13.5 | 0.868 | 25.2 | 9.4 | 11.2 |

160 dB 10X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0445 | 6.093 | 94.6 | 88.7 | 3.297 | 84.8 | 66.5 | 3.3 |
| 0492 | 5.059 | 117.9 | 77.6 | 2.399 | 102.9 | 55.2 | -3.3 |
| 0503 | 2.586 | 116.9 | 33.1 | 4.100 | 89.3 | 33.3 | -1.7 |
| 0506 | 4.292 | 74.0 | 66.7 | 2.111 | 30.6 | 66.7 | 13.3 |
| 0508 | 4.221 | 90.7 | 44.5 | 3.069 | 90.7 | 66.3 | 0.0 |
| Mean | 4.450 | 98.8 | 62.1 | 2.995 | 79.7 | 57.6 | 2.3 |
| S.D. | 1.286 | 18.6 | 23.0 | 0.783 | 28.2 | 14.4 | 6.6 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0445 | 1.425 | 61.4 | 12.3 | 4.305 | 82.8 | 21.3 | 3.3 |
| 0492 | 3.014 | 73.7 | 44.2 | 2.695 | 82.6 | 44.2 | -3.3 |
| 0503 | 1.540 | 83.0 | 11.2 | 1.922 | 71.4 | 21.8 | -3.3 |
| 0506 | 2.382 | 80.1 | 21.8 | 1.176 | 57.8 | 10.6 | 0.0 |
| 0508 | 6.089 | 125.3 | 20.7 | 5.286 | 57.1 | 31.9 | -3.3 |
| Mean | 2.890 | 84.7 | 22.1 | 3.077 | 70.3 | 26.0 | -1.3 |
| S.D. | 1.902 | 24.2 | 13.3 | 1.694 | 12.6 | 12.7 | 3.0 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0445 | 2.272 | 79.4 | 25.7 | 2.493 | 72.8 | 55.9 | 1.7 |
| 0492 | 3.497 | 96.7 | 60.4 | 5.648 | 151.4 | 90.6 | -3.3 |
| 0503 | 3.833 | 95.7 | 35.5 | 2.682 | 91.0 | 30.2 | -5.0 |
| 0506 | 2.695 | 89.4 | 50.6 | 5.750 | 87.3 | 64.9 | 0.0 |
| 0508 | 6.562 | 93.6 | 54.3 | 3.043 | 40.5 | 60.4 | -1.7 |
| Mean | 3.772 | 91.0 | 45.3 | 3.923 | 88.6 | 60.4 | -1.7 |
| S.D. | 1.679 | 7.0 | 14.3 | 1.633 | 40.4 | 21.6 | 2.6 |

160 dB 100X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0521 | 1.486 | 26.7 | 25.2 | 1.218 | 5.7 | 6.6 | 25.0 |
| 0537 | 2.080 | 24.7 | 25.2 | 1.486 | 27.4 | 12.8 | 30.0 |
| 0542 | ****** | ****** | ****** | ****** | 44.0 | 6.2 | 41.7 |
| 0543 | 1.288 | 37.6 | 19.0 | 0.946 | 14.7 | 6.2 | 15.0 |
| 0544 | 1.659 | 22.9 | 31.4 | 0.946 | 9.8 | 6.2 | 25.0 |
| Mean | 1.628 | 28.0 | 25.2 | 1.149 | 20.3 | 7.6 | 27.3 |
| S.D. | 0.337 | 6.6 | 5.1 | 0.259 | 15.5 | 2.9 | 9.7 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0521 | 2.042 | 37.4 | 31.9 | 2.476 | 32.5 | 15.1 | 36.7 |
| 0537 | 5.201 | 38.5 | 47.6 | 1.250 | 36.6 | 10.6 | 36.7 |
| 0542 | ****** | ****** | ****** | ****** | 5.4 | ****** | 48.3 |
| 0543 | 3.570 | 58.6 | 42.5 | 3.570 | 52.2 | 31.3 | 1.7 |
| 0544 | 1.924 | 56.6 | 37.5 | ****** | 0.0 | 17.4 | 40.0 |
| Mean | 3.184 | 47.8 | 39.9 | 2.432 | 25.3 | 18.6 | 32.7 |
| S.D. | 1.540 | 11.4 | 6.7 | 1.161 | 22.0 | 8.9 | 18.0 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0521 | 3.610 | 53.0 | 29.2 | 4.100 | 13.3 | 6.2 | 28.3 |
| 0537 | 5.249 | 63.4 | 29.2 | ****** | 0.0 | 0.0 | 48.3 |
| 0542 | ****** | ****** | ****** | ****** | ****** | ****** | 50.0 |
| 0543 | 2.593 | 43.1 | 22.1 | 2 772 | 63.2 | 14.2 | -1.7 |
| 0544 | 2.359 | 35.5 | 30.1 | ****** | 13.1 | 0.0 | 43.3 |
| Mean | 3.453 | 48.8 | 27.7 | 3.436 | 22.4 | 5.1 | 33.7 |
| S.D. | 1.315 | 12.1 | 3.7 | 0.939 | 27.9 | 6.7 | 21.5 |

160 dB 100X 10/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0521 | 4.100 | 98.5 | 77.5 | 1.629 | 36.7 | 33.2 | 35.0 |
| 0537 | 6.093 | 75.0 | 99.7 | 2.512 | 64.1 | 55.3 | 18.3 |
| 0542 | ****** | ****** | ****** | 0.827 | 19.9 | 0.0 | 46.7 |
| 0543 | 4.100 | 70.4 | 55.4 | 3.621 | 72.9 | 55.3 | 3.3 |
| 0544 | 2.581 | 76.5 | 77.4 | ****** | 0.0 | 10.9 | 30.0 |
| Mean | 4.218 | 80.1 | 77.5 | 2.147 | 38.7 | 31.0 | 26.7 |
| S.D. | 1.440 | 12.5 | 18.1 | 1.199 | 30.3 | 25.3 | 16.5 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0521 | 7.799 | 66.9 | 41.9 | ****** | 13.1 | 0.0 | 40.0 |
| 0537 | 6.528 | 149.3 | 41.9 | 5.286 | 149.3 | 20.7 | -0.8 |
| 0542 | ****** | ****** | ****** | ****** | ****** | 0.0 | 45.0 |
| 0543 | 4.881 | 110.0 | 75.5 | 3.258 | 69.9 | 31.9 | 1.7 |
| 0544 | 4.164 | 124.3 | 42.5 | 4.058 | 92.5 | 8.9 | 18.3 |
| Mean | 5.843 | 112.7 | 50.5 | 4.201 | 81.2 | 12.3 | 20.8 |
| S.D. | 1.637 | 34.5 | 16.7 | 1.021 | 56.4 | 13.9 | 21.2 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0521 | 8.399 | 121.2 | 70.2 | 5.750 | 60.4 | 19.6 | 26.7 |
| 0537 | 3.824 | 149.9 | 75.5 | 3.144 | 140.9 | 24.9 | 10.0 |
| 0542 | ****** | ****** | ****** | ****** | 0.0 | ****** | 40.0 |
| 0543 | 1.840 | 71.1 | 20.4 | 1.929 | 73.2 | 15.1 | 1.7 |
| 0544 | 1.533 | 67.1 | 20.4 | 2.980 | 93.7 | 45.3 | -1.7 |
| Mean | 3.899 | 102.4 | 46.6 | 3.451 | 73.6 | 26.2 | 15.3 |
| S.D. | 3.167 | 40.2 | 30.4 | 1.625 | 51.3 | 13.3 | 17.6 |

160 dB 100X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1698 | 2.193 | 23.9 | 31.6 | 0.805 | 17.7 | 12.2 | 8.3 |
| 1775 | 1.486 | 22.4 | 25.2 | 1.129 | 26.0 | 25.2 | 6.7 |
| 1782 | 2.316 | 19.2 | 31.6 | 0.980 | 22.7 | 19.2 | 6.7 |
| 1787 | ****** | ****** | ****** | 0.820 | 25.0 | 25.5 | 18.3 |
| 1817 | 1.286 | 34.5 | 24.8 | 0.944 | 28.4 | 31.4 | 0.0 |
| Mean | 1.820 | 25.0 | 28.3 | 0.936 | 23.9 | 22.7 | 8.0 |
| S.D. | 0.511 | 6.6 | 3.8 | 0.132 | 4.1 | 7.3 | 6.6 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1698 | 1.205 | 40.7 | 11.2 | 0.958 | 55.4 | 17.4 | 3.3 |
| 1775 | 1.837 | 37.4 | 27.4 | 2.100 | 47.7 | 32.5 | 3.3 |
| 1782 | 1.551 | 34.9 | 16.8 | 1.400 | 19.9 | 11.8 | 25.0 |
| 1787 | 1.877 | 65.0 | 26.9 | 1.385 | 41.1 | 16.2 | 16.3 |
| 1817 | 1.443 | 58.9 | 16.8 | 1.417 | 43.8 | 21.8 | 1.7 |
| Mean | 1.583 | 47.4 | 19.8 | 1.452 | 41.6 | 19.9 | 9.9 |
| S.D. | 0.280 | 13.6 | 7.1 | 0.410 | 13.3 | 7.9 | 10.3 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1698 | 2.874 | 51.9 | 31.9 | 1.530 | 33.6 | 7.1 | 23.3 |
| 1775 | 4.568 | 56.7 | 22.1 | 1.642 | 51.9 | 8.0 | 3.3 |
| 1782 | 4.100 | 34.4 | 22.1 | 0.677 | 27.5 | 8.0 | 20.0 |
| 1787 | 2.593 | 48.6 | 14.2 | 3.097 | 76.3 | 61.1 | 13.2 |
| 1817 | ****** | 16.1 | ****** | 1.568 | 46.8 | 5.7 | 5.0 |
| Mean | 3.533 | 41.6 | 22.6 | 1.703 | 47.2 | 18.0 | 13.0 |
| S.D. | 0.951 | 16.5 | 7.3 | 0.873 | 19.0 | 24.1 | 8.8 |

160 dB 100X 1/M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1698 | 2.728 | 65.8 | 33.2 | 4.232 | 94.9 | 66.4 | 18.3 |
| 1775 | 3.951 | 97.1 | 44.3 | 4.754 | 77.6 | 44.4 | 11.7 |
| 1782 | 3.069 | 80.7 | 44.3 | 2.733 | 38.1 | 22.1 | 10.0 |
| 1787 | 6.768 | 72.4 | 66.6 | 4.754 | 127.9 | 44.4 | 13.7 |
| 1817 | 3.489 | 35.6 | 44.3 | 3.654 | 111.3 | 33.2 | 6.7 |
| Mean | 4.001 | 70.3 | 46.5 | 4.025 | 90.0 | 42.1 | 12.1 |
| S.D. | 1.613 | 22.7 | 12.2 | 0.853 | 34.5 | 16.4 | 4.3 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1698 | 3.725 | 68.3 | 55.4 | 2.624 | 62.0 | 44.2 | 26.7 |
| 1775 | 2.382 | 78.2 | 23.0 | 2.132 | 63.7 | 22.4 | -5.0 |
| 1782 | 3.827 | 58.8 | 66.6 | 4.152 | 56.9 | 54.3 | 5.0 |
| 1787 | 6.687 | 125.4 | 43.1 | 4.305 | 59.3 | 10.1 | 27.0 |
| 1817 | 3.735 | 96.5 | 76.1 | 1.227 | 63.7 | 0.0 | 8.3 |
| Mean | 4.071 | 85.5 | 52.8 | 2.888 | 61.1 | 26.2 | 12.4 |
| S.D. | 1.580 | 26.4 | 20.8 | 1.323 | 3.0 | 22.8 | 14.1 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 1698 | 2.134 | 91.5 | 10.6 | 3.833 | 55.9 | 30.2 | 31.7 |
| 1775 | 1.917 | 86.7 | 25.7 | 7.475 | 80.8 | 70.2 | 3.3 |
| 1782 | 2.440 | 88.6 | 5.3 | 3.089 | 45.6 | 15.1 | 13.3 |
| 1787 | ****** | 11.2 | 45.3 | 5.936 | 116.4 | 105.7 | 26.7 |
| 1817 | 4.213 | 97.8 | 155.9 | 17.245 | 27.2 | 67.2 | -1.7 |
| Mean | 2.676 | 75.2 | 48.5 | 7.515 | 65.2 | 57.7 | 14.7 |
| S.D. | 1.047 | 36.0 | 62.0 | 5.708 | 34.5 | 35.8 | 14.4 |

160 dB 100X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 0.5 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0546 | 0.416 | 10.8 | 12.6 | 2.436 | 0.0 | 5.8 | 38.3 |
| 0547 | 0.811 | 15.5 | 19.0 | ****** | 9.0 | 6.2 | 35.0 |
| 0548 | 1.289 | 36.1 | 18.8 | 1.486 | 47.2 | 18.8 | 3.3 |
| 0549 | 1.253 | 21.1 | 12.6 | 1.066 | 18.8 | 6.2 | 6.7 |
| 0550 | 1.156 | 22.1 | 12.6 | 0.660 | 19.9 | 6.6 | 10.4 |
| Mean | 0.985 | 21.1 | 15.1 | 1.412 | 19.0 | 8.7 | 18.7 |
| S.D. | 0.370 | 9.5 | 3.4 | 0.761 | 17.7 | 5.6 | 16.6 |

Probe Frequency 1.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0546 | 1.719 | 42.4 | 26.3 | 1.013 | 17.4 | 16.2 | 40.0 |
| 0547 | 2.100 | 45.2 | 26.9 | ****** | ****** | 10.6 | 46.7 |
| 0548 | 2.171 | 55.7 | 26.3 | 2.557 | 48.7 | 26.9 | 16.7 |
| 0549 | 2.557 | 37.4 | 26.9 | 1.216 | 32.3 | 16.8 | 16.7 |
| 0550 | 2.738 | 58.3 | 48.1 | 1.620 | 36.6 | 33.0 | 25.0 |
| Mean | 2.257 | 47.8 | 30.9 | 1.602 | 33.7 | 20.7 | 29.0 |
| S.D. | 0.401 | 8.9 | 9.6 | 0.685 | 12.9 | 9.0 | 13.7 |

Probe Frequency 2.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0546 | 3.199 | 38.8 | 6.2 | ****** | ****** | 0.0 | 40.0 |
| 0547 | 3.253 | 46.2 | 13.3 | ****** | 0.0 | ****** | 60.0 |
| 0548 | 2.772 | 52.5 | 6.2 | 2.039 | 44.9 | 14.2 | 6.7 |
| 0549 | 4.100 | 34.4 | 30.1 | 2.593 | 50.1 | 22.1 | 8.3 |
| 0550 | 1.378 | 35.2 | 7.1 | 2.359 | 35.5 | 14.2 | 21.7 |
| Mean | 2.941 | 41.4 | 12.6 | 2.330 | 32.6 | 12.6 | 27.3 |
| S.D. | 0.997 | 7.8 | 10.2 | 0.278 | 22.6 | 9.2 | 22.6 |

160 dB 100X 1/10M

INDIVIDUAL TUNING CURVE STATISTICS

Probe Frequency 4.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0546 | 2.890 | 50.1 | 44.3 | ****** | 14.6 | 0.0 | 45.0 |
| 0547 | 4.754 | 122.9 | 66.5 | ****** | ****** | 0.0 | 51.7 |
| 0548 | 3.343 | 98.1 | 66.4 | 4.524 | 108.9 | 66.6 | 15.0 |
| 0549 | 6.093 | 109.6 | 66.6 | 8.772 | 83.4 | 77.7 | 1.7 |
| 0550 | 4.121 | 98.9 | 55.3 | 2.583 | 76.1 | 44.2 | 0.0 |
| Mean | 4.240 | 95.9 | 59.8 | 5.293 | 70.7 | 37.7 | 22.7 |
| S.D. | 1.259 | 27.5 | 9.9 | 3.165 | 40.0 | 36.5 | 24.3 |

Probe Frequency 8.0 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0546 | 1.233 | 68.2 | 11.2 | ****** | ****** | ****** | 58.3 |
| 0547 | 1.965 | 79.6 | 11.2 | ****** | ****** | ****** | 53.3 |
| 0548 | 6.528 | 77.7 | 53.1 | 5.286 | 67.7 | 20.7 | 21.7 |
| 0549 | 1.176 | 48.4 | 10.6 | 1.145 | 35.0 | 0.0 | 5.0 |
| 0550 | 3.094 | 107.6 | 21.3 | 3.094 | 69.2 | 21.3 | 3.3 |
| Mean | 2.799 | 76.3 | 21.5 | 3.175 | 57.3 | 14.0 | 28.3 |
| S.D. | 2.224 | 21.4 | 18.2 | 2.071 | 19.4 | 12.1 | 26.2 |

Probe Frequency 11.2 kHz

| | PREEXPOSURE | | | POSTEXPOSURE | | | |
|---|---|---|---|---|---|---|---|
| Animal | Q10dB | HF Slope | LF Slope | Q10dB | HF Slope | LF Slope | PTS |
| 0546 | 1.561 | 73.7 | 15.1 | ****** | ****** | ****** | 58.3 |
| 0547 | 4.870 | 95.4 | 100.4 | ****** | ****** | ****** | 56.7 |
| 0548 | 4.038 | 109.9 | 75.5 | 2.529 | 82.9 | 15.1 | 5.0 |
| 0549 | 2.366 | 61.3 | 10.6 | 11.496 | 115.5 | 4.5 | -5.0 |
| 0550 | 4.247 | 107.8 | 80.8 | 2.545 | 72.8 | 50.6 | 1.7 |
| Mean | 3.416 | 89.6 | 56.5 | 5.523 | 90.4 | 23.4 | 23.3 |
| S.D. | 1.390 | 21.4 | 40.9 | 5.173 | 22.3 | 24.1 | 31.4 |